CHEMICAL LIBRARY
GENERAL LIBRARY
JUN 13 1920
UNIV. OF MICH.

Vol. 18. No. 6 JUNE, 1920

THE METAL INDUSTRY

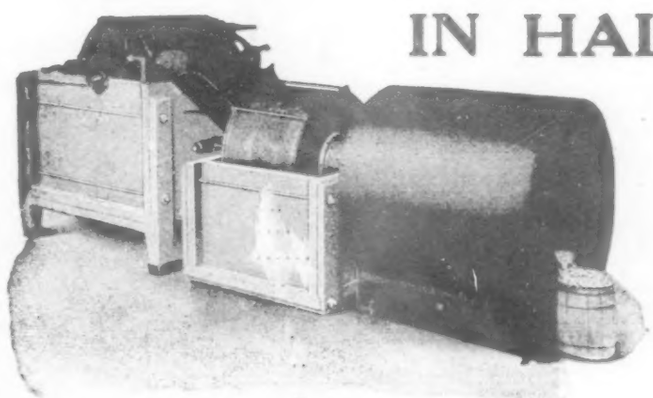
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

Entered as second class matter February 10, 1903, at the post-office at New York under the Act of 1879.

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

SUBSCRIPTION PRICE PER YEAR, UNITED STATES AND CANADA, ONE DOLLAR. OTHER COUNTRIES, TWO DOLLARS
THE METAL INDUSTRY PUBLISHING COMPANY, 99 JOHN STREET, NEW YORK

CUT YOUR PLATING COST IN HALF



U. S. JUNIOR PLATING BARREL AND DRYER

The apparatus illustrated herewith is the only machine which automatically empties, then washes, drains and dries the plated material. The

U. S. JUNIOR

Patent Automatic Self Emptying Plating Barrel will save its cost in a very few months. It does high grade efficient work and is the pride of every plater who uses it.

OTHER PLATING EQUIPMENT

National Alternating Rotating Plating Barrel (Patented) for plating all classes of small material.

U. S. Standard Automatic Self Emptying Plating Barrel (Patented).

Moving Cathode Plating Tank (Moving Tank) (Patented) for plating articles of medium size.

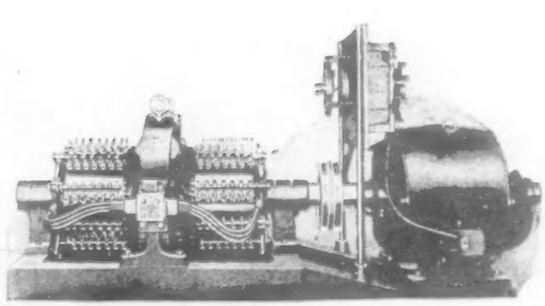
Cleaning, Rinsing and Drying Apparatus (Patented).

Pickling, Cleaning and Neutralizing Apparatus (Patented).

Automatic Pipe Tank (Patented).

Wire Tank (Patented) for plating round or flat wire in continuous lengths.

Universal High Efficiency Plating Generator.



UNIVERSAL PLATING GENERATOR

U. S. ELECTRO GALVANIZING COMPANY

(INCORPORATED 1896)

32 STOCKTON ST., BROOKLYN, N. Y.

JOB PLATING

Largest Jobbing Facilities in New York City

Established 1889

PLANT BOUNDED BY
CENTRE, BROOME AND LAFAYETTE STREETS

PLATING POLISHING DIPPING LACQUERING BARREL PLATING AND TUMBLING

Manufacturers' Work Our Specialty

PROMPT ATTENTION GOOD WORK

PHILIP SIEVERING

410 BROOME STREET NEW YORK

Telephone: Spring 2577

THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

Vol. 18 NEW YORK, JUNE, 1920 No. 6

American Electro-Platers' Society Convention

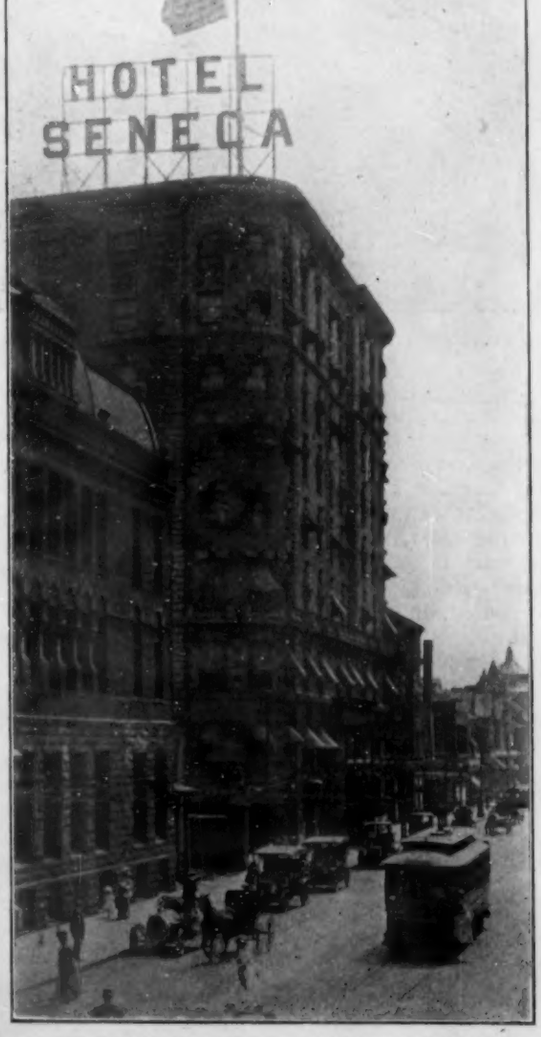
A Description of the Plating and Finishing Shops of Rochester, N. Y., the Convention City

Written for The Metal Industry by GARDNER B. ELLIS

The history of electro-plating in Rochester is rather obscure in many ways. There appears to be no one who can tell with any degree of accuracy just when the first plating was begun in this city. A number of platers are living in Rochester who are able to recall plants that existed before their arrival, some thirty-five years ago, but none who knew the pioneers of the industry or remember who they were.

According to the best information at hand, the first electro-plating took place in the plant of the Sill Stove Works, an extensive concern that was established in Rochester in 1848. James Brackett was the first president and Frederick Will was secretary. The first plant was located in Oak street, near what was then called the Charlotte Railroad. Nickel and copper plating began in this concern in 1851, and that feature of the stove decoration greatly enhanced its selling qualities. The Sill works today are one of the city's most important industries. George Blum is in charge of the plating room. During the past month the concern has installed a galvanizing equipment and a copper plant for oxidizing.

At present the Bausch & Lomb Optical Company, another old-time company which does plating, is the largest concern of its kind in the United States, if not in the entire world. Lawrence Breithaupt is foreman in charge of the company's extensive electro-plating rooms.



HOTEL SENECA, THE CONVENTION HEADQUARTERS.

John J. Bausch, a poor immigrant boy of 17 years, came to America in 1847 to seek relief from oppressive conditions in central Europe. Although he had served an apprenticeship with an optician in Switzerland, America offered no opening for one of his trade. If optical goods were wanted, they must come from Europe, following out America's old idea that Europe produced better workmanship than America.

His first job was in the kitchen of a Buffalo hotel, with a weekly salary of $3. Later he learned the trade of wood-turning and came to Rochester, where he was married while earning $7.50 a week. An accident that cost him three fingers of his right hand forced him to quit the woodturning business, and he turned again to the optical trade, renting a small space in front of a cobbler's shop, where he displayed his wares by hanging them on a wire stretched across the window.

The growth of the business for years was slow, as is usually the case with small concerns. To show the small beginning of the company it is sufficient to say that Henry Lomb was admitted as a full partner on the strength of a $60 loan. Much progress was made, however. When Mr. Bausch became dissatisfied with the quality of the lenses he was receiving from Europe, he determined to grind his own by hand, and to this end built what is believed to be the first lens-grinding machine in America. His lenses were so

superior to the imported ones that, when some of them fell into the hands of New York opticians, they asked him to sell them any surplus he might have. At another time he found a piece of vulcanite, and recognized it as an admirable substitute for the horn which was then commonly used in eyeglass frames. To soften it for this work it was placed on the family cook stove, while the frames were punched out on a hand press.

BIRDS'-EYE VIEW OF THE BAUSCH & LOMB WORKS, ROCHESTER, N. Y.

Growth was more rapid after the end of the Civil War, during which Mr. Lomb had been in the army. A building with one small room and water power was rented, and here Mr. Bausch built the first power lens-grinding and polishing machine in America. He also invented and applied the first nosepiece to an eyeglass, principles that are still embodied in the construction of eyeglass frames. In 1874, when the sons of the families were old enough to enter the business, a site on the gorge of the Genesee River was purchased, and the first building of the present plant erected.

Microscopes, produced at prices low enough to enable the poorer schools to buy them, were the first product. Photographic lenses soon followed. As the plant developed, the number of lines increased. Projection and photomicrographic apparatus, stereo-prism binoculars, engineering instruments, range finders and searchlight mirrors are some of the present products. At present the Bausch & Lomb Optical Company is the largest concern of its kind in America, if not in the world.

The General Railway Signal Company, the second largest signal company in the United States, is situated at the extreme western end of the city of Rochester, and is reached after a five-minute walk west from the terminal of the West Avenue car line.

The plant occupies about thirty-two acres of land, and is located on the main line of the New York Central R. R., and has direct shipping connections with that road, the B, R. & P. Railroad, and the Pennsylvania Railroad.

This company are manufacturers and erectors of railway signal systems and appliances, and their products are electric interlocking employing dynamic indication, mechanical interlocking, electro mechanical interlocking, automatic block signaling, and manually operated block signals.

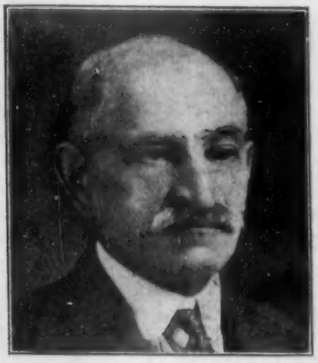
Not only are their systems and appliances used by over one hundred railroads in the United States and Canada, but extensive installations have been made in foreign countries, among which are the block and interlocking systems on the South Australian Railways, Australia, and the electric interlocking systems at Victoria Station, London.

This company also specializes in the manufacture of grey iron, brass, aluminum and alloy castings, coil winding and impregnating, machine work of all kinds, drop and hand forgings, plating, heat treating and annealing, and have a large patronage in and around Rochester, as

THE GENERAL RAILWAY SIGNAL COMPANY PLANT, ROCHESTER, N. Y.

NATIONAL OFFICERS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY — 1919-1920

OSCAR E. SERVIS,
National President.



PHILIP UHL,
National 2nd Vice-President.

JOHN E. STERLING,
National Secretary.

H. H. WILLIAMS,
Editor.

OFFICERS OF THE ROCHESTER, N. Y. BRANCH

GEORGE HESSELINK,
President.

S. P. GARTLAND,
Vice-President.
National 1st Vice-President

H. FRANK SPEARY,
Secretary-Treasurer; Chairman Information Committee.

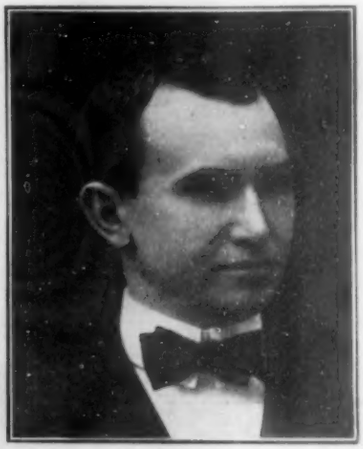
EDWIN CROWLEY, JR.
Chairman Printing Committee.

MEMBERS OF ROCHESTER EXECUTIVE COMMITTEE

HARRY C. BERNARD,
Chairman Program and Publicity Committee

RAMON P. LOPEZ,
Chairman Entertainment Committee.

RALPH K. HUTCHINGS,
Chairman Reception Committee.



ADOLPH WAHL,
Chairman Exhibits.

well as in the New England States and as far west as the Pacific Coast.

The various buildings and departments of the plant are located with a view to making the process of manufacture a continuous one, so that from the time the raw

SECTION OF PLATING ROOM OF TAYLOR INSTRUMENT WORKS, ROCHESTER, N. Y.

material is received, until the completed work is ready to ship, all parts and supplies will move through the works in one direction, and the completed work may be shipped in its entirety.

The manufacture of railway signals and appliances calls for considerable plating and polishing, and this department of the plant is in charge of Mr. E. E. Fitch, Jr. During the past year they have also done a great deal of this class of work for concerns in and around Rochester.

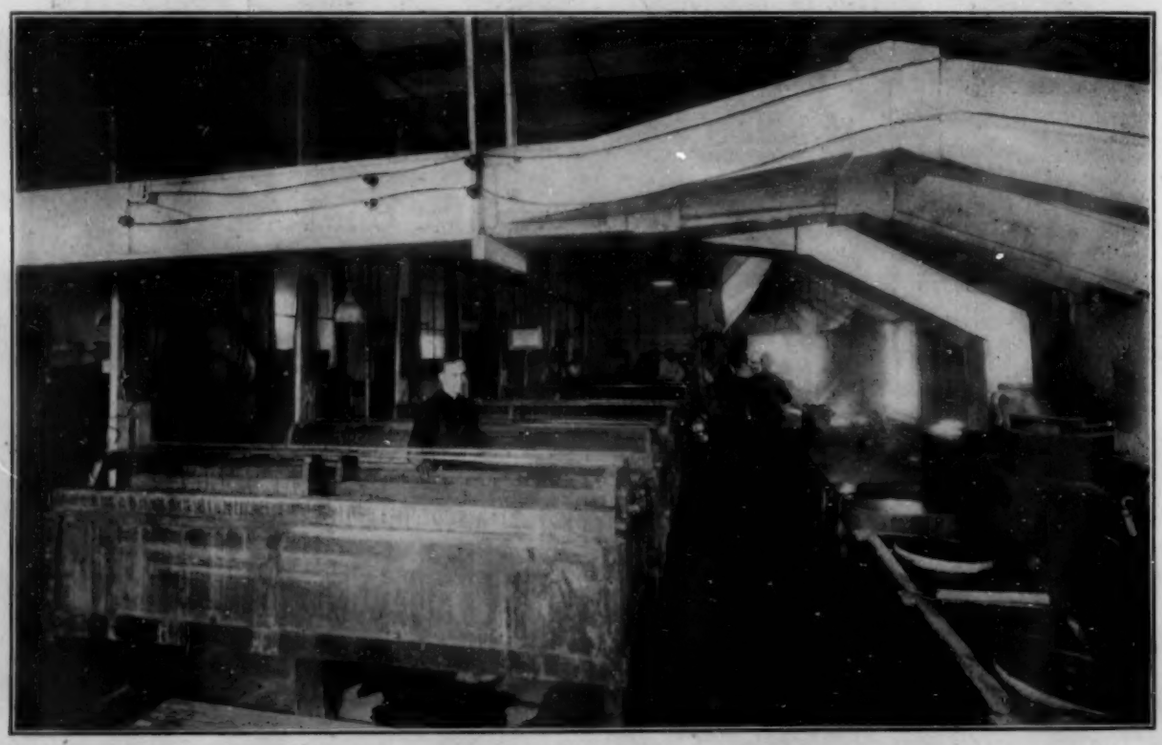
The Galusha Stove Works, established in 1853, is another old-time institution that added an electro-plating shop to its plant in the early days. Jacob Hasselwander is foreman of the plating room of this concern.

The Co-operative Stove Foundries, Inc., was established in 1867 and began work in Hill street (now Industrial street). It was one of the first co-operative institutions in the United States, the employees furnishing the $30,000 which was its original capital stock. Henry Cribben, of Chicago, famous as a manufacturer of foundry products, was its first president. The Co-operative works began plating in 1870, nickel and copper being exclusively employed. Like the other local stove concerns the Co-operative still maintains its high reputation. John Flans is foreman of the plating shop.

Munn, Converse & Anstice established one of the first foundries to do electro-plating of all kinds in 1872, locating at North Water and River streets. They made a specialty of nickel-plating and japanning in the early days. More than 100 men were employed then, and a still larger force is now used by its successor, Josiah Anstice & Company. The concern now produces hardware specialties. Thomas Harper, Librarian of the Rochester Branch of the American Electro-Platers' Society, is foreman of the plating shop.

The Taylor Instrument Company, at No. 95 Ames street, is one of the city's most interesting plants. The concern makes thermometers, barometers and compasses. Herbert J. Winn is president of the corporation. Sylvester P. Gartland, first vice-president of the Rochester Branch of the American Electro-Platers' Society, is foreman of the plating room.

Henry Toohill, foreman of the plating room of the Likly Brothers trunk works in Lyell avenue, is one of



ELECTROPLATING ROOM OF HAWKEYE PLANT, EASTMAN KODAK WORKS, ROCHESTER, N. Y.

the veteran platers in Rochester. He came to the city some thirty-three years ago. His father, John Toohill, was one of the first platers in America. He died in New York in 1912 at the age of 88. The elder Toohill was employed in metal plating in Meriden, Conn., in 1854, when Britannia, or hollow-ware, was first introduced. Mr. Toohill says that when he first came to Rochester a small silver-plating plant was conducted in a building near Main and Graves streets, operated by a man named Streeter. Streeter is believed to have been the first silver-plater in the city.

Two important wings of the famous Eastman Kodak Company are the Premo works in South avenue and the Hawkeye plant in St. Paul street. All platers generally are familiar with the part played by those institutions in the use of metals, particularly copper, brass, nickel, and bronze. Ralph Hutchings, chairman of the Rochester Branch's reception committee, is at the head of the Premo plating shop. Herbert Groh is foreman of the Hawkeye shop.

The Van Bergh Silver Plate Company's plant in Main street west is the only concern of its kind in Rochester. Frederick W. Van Bergh is president of the company. George Hesselink, president of the Rochester Branch, is in charge of the plating department.

Metal Arts Company, at No. 77 South avenue, is a new institution in Rochester, where much electro-plating is carried on. The business was established in 1913. John Jack is president and Adolph Wahl, chairman of exhibits at the coming convention, is at the head of the plating room.

Another of Rochester's famous manufacturing concerns is Yawman & Erbe, makers of office furniture and office filing devices. Their big plant is at No. 424 St. Paul street. Philip R. Yawman is president. Charles Boering is foreman of the plating room. This factory's metal filing products are used all over the continent.

The Ritter Dental Company has an extensive industry at No. 404 West avenue, making dental chairs, engines and lathes. James Finkle directs the work in the plating shop.

The Movette Camera Company is a new and novel industry in Rochester. The company manufactures moving picture cameras. Frank L. Hough is vice-president. John Jordan looks after the plating room. The Movette concern promises to startle the electro-platers during the coming convention.

Todd Protectograph Company, at 1050 University avenue, has a national reputation owing to its check-protecting devices. Joseph Michaels is the head plater of that establishment.

ELECTROPLATING ROOM OF VAN BERGH SILVER PLATE COMPANY, ROCHESTER, N. Y.

The Rochester Stamping Company, who have two plants in the city, are large makers of table appliances and cutlery. George W. Robeson is president of the concern. Herman Jordan has charge of the plating rooms.

A corner of the plating plant of the North East Electric Company, manufacturers of electrical equipment for automotive vehicles is shown on page 260. An average of half a million parts a day are plated in this department, which is in charge of R. P. Lopez, chairman of the Committee on Entertainment.

Smaller electro-plating concerns are as follows:

Standard Plating Works, No. 177 Main street, West.

Union Polishing and Plating Company, No. 14 Commercial street.

The Rochester Branch of the American Electro-Platers' Society was organized in 1911. It now includes some forty members, all of whom are prominently identified with the industry in the larger plants in the city.

The convention will be held at Hotel Seneca, the city's leading hotel. From present indications the eighth national convention will measure up to all expectations. Fully 400 delegates, with their wives, are scheduled to attend.

GENERAL PROGRAMME

JUNE 30

MORNING

8:00 A. M. Registration of all members of the Society and guests in.

Distribution of badges, credentials and tickets for auto and boat trip.

10:00 A. M. Assembling of delegates and visitors in Rose Room, Second Floor, to get acquainted.

AFTERNOON

1:30 P. M. Leave hotel for visit to plating plants of Rochester.

EVENING

6:30 P. M. Leave Hotel Seneca for Sea Breeze.

JULY 1

MORNING

9:00 A. M. Meeting of Executive Board and Credentials Committee in Rose Room, Second Floor.

10:00 A. M. Convention called to order by National President Mr. Oscar E. Servis of Chicago, Ill.

10:05 A. M. Address of Welcome.

10:20 A. M. Acceptance of the keys of the City and Freedom of Rochester by Mr. Sylvester Garland, National Vice-President, of Rochester, N. Y.

10:30 A. M. Opening address by Mr. G. H. Hesselink, President of Rochester Branch.

10:45 A. M. Introduction of members.

11:00 A. M. Address by Mr. Walter Fraine, Past President.

11:30 A. M. Address by Dr. W. Blumn of the Bureau of Standards.

12:00 A. M. Address by Mr. H. H. Williams of St. Louis, Editor of the "Monthly Review."

12:30 P. M. Adjournment.

AFTERNOON

2:00 P. M. Business session, Hotel Seneca. Papers will be read and discussed. These sessions will be of a highly educational value, and all should consider it a great privilege to attend every one.

EVENING

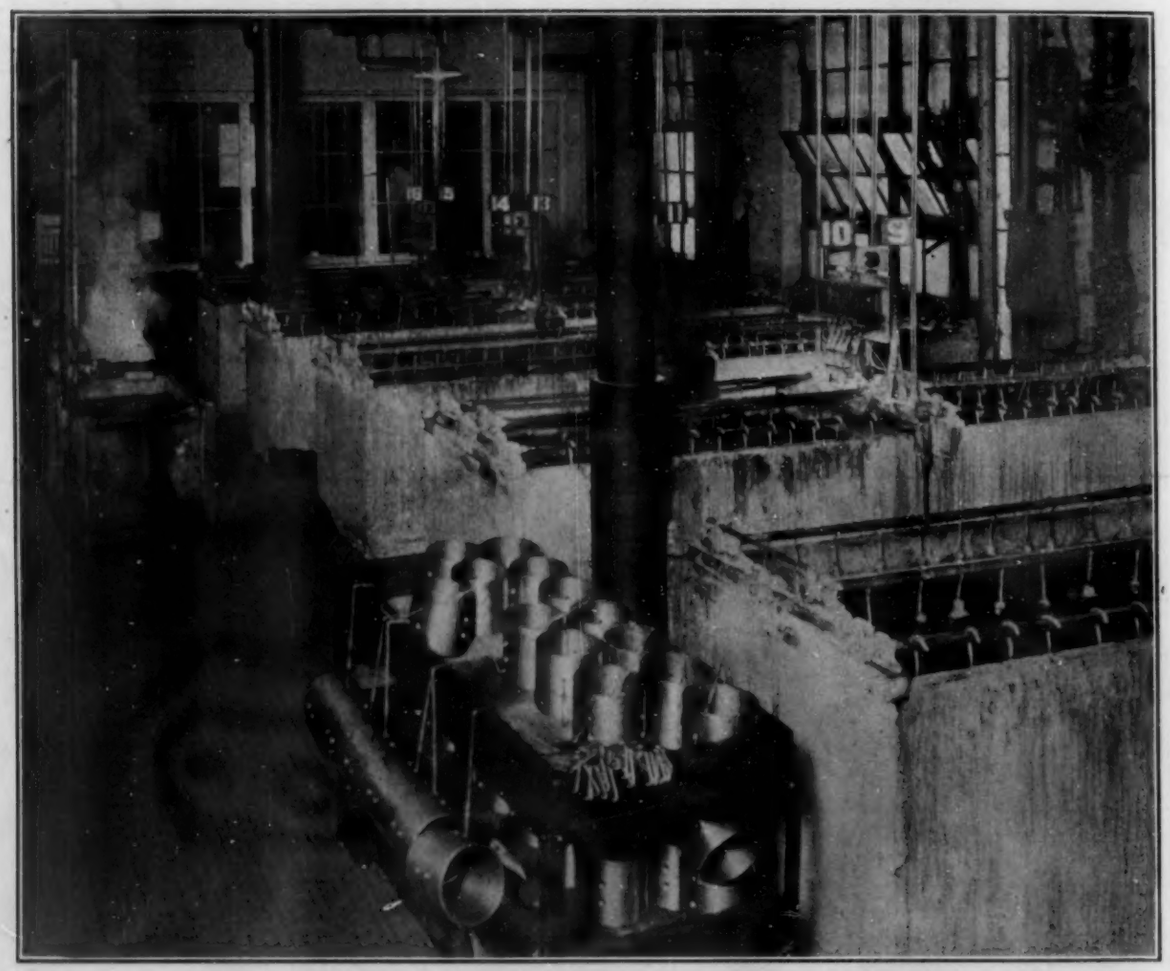
8:00 P. M. Evening left open. Tell the committee what you wish to do and they will do the necessary to make it an enjoyable evening.

JULY 2

MORNING

8:00 A. M. Special train leaves B., R. & P. Depot, West Main St., at 8:00 o'clock sharp.

8:30 A. M. Steamer Ontario No. 2 leaves Genesee Dock at



ELECTROPLATING ROOM OF NORTH EAST ELECTRIC COMPANY, ROCHESTER, N. Y.

8:30 sharp for all-day cruise on Lake Ontario. Boat is for use of convention exclusively. Use your tickets. Compliments of Rochester Branch.

9:30 A. M. Business session on deck. Papers will be read and discussed. Dancing and entertainment.

1:00 P. M. Arrive at Cobourg, Canada, for three-hour stop; will be taken up with different events, including ball game and bathing.

4:30 P. M. Steamer leaves Cobourg 4:30 P. M. sharp.

5:00 P. M. Business session on deck. Papers will be read and discussed.

6:30 P. M. Buffet lunch will be served on deck. Given by Rochester branch.

7:00 P. M. Dancing and entertainment on deck.

10:00 P. M. Boat arrives at Genesee dock. Special train to B., R. & P. Depot, Rochester. Please try to be on hand, as it will help the committee very much to carry out the day's schedule. Thank you.

JULY 3

MORNING

8:30 A. M. Business session at Hotel Seneca. Revision of constitution, election of officers, selection of 1921 Convention city. Final business session.

AFTERNOON

2:00 P. M. Auto sight-seeing trip around Rochester Parks and Boulevards. Compliments of Rochester branch and manufacturing plants. If you are on hand promptly in front of Convention Hall it will aid the committee very materially. Thank you.

EVENING

7:00 P. M. Annual banquet at Hotel Seneca. Use your tickets. Installation of officers. Good entertainment (Movette); speeches that will interest you; dancing up to 12:00 o'clock.

Do not fail to attend as Rochester Branch wants to show you that they were on the job until the last minute.

LADIES' PROGRAMME

JUNE 30

MORNING

8:00 A. M. Registration of all members of the Society and guests in.

10:00 A. M. Assembling of delegates and visitors in Rose Room, Second Floor, to get acquainted.

AFTERNOON

2:00 P. M. Trip to Glen Haven, boat to Sea Breeze.

6:00 P. M. Luncheon at Sea Breeze. Compliments of Rochester branch.

JULY 1

MORNING

9:00 A. M. Trip to Kodak Park.

AFTERNOON

2:00 P. M. Leave hotel for visit to University Art Gallery.

EVENING

8:00 P. M. Evening left open. Tell the committee what you wish to do and they will do the necessary to make it an enjoyable evening.

JULY 2

MORNING

8:00 A. M. Special train leaves B., R & P. Depot, West Main St., at 8:00 o'clock sharp.

8:30 A. M. Steamer Ontario No. 2 leaves Genesee dock at 8:30 sharp for all-day cruise on Lake Ontario. Boat is for use of convention exclusively. Use your tickets. Compliments of Rochester.

9:30 A. M. Dancing and entertainment.

1:00 P. M. Arrive at Cobourg, Canada, for three-hour stop. Will be taken up with different events, including ball game and bathing.

4:30 P. M. Steamer leaves Cobourg 4:30 sharp.

6:30 P. M. Buffet lunch will be served on deck. Given by Rochester Branch.

7:00 P. M. Dancing and entertainment on deck.

8:00 P. M. Boat docks at Genesee dock. Special train to B., R. & P. Depot, Rochester. Please try to be on hand, as it will help the committee very much to to carry out the day's schedule. Thank you.

JULY 3

MORNING

9:00 A. M. Shopping tour.

AFTERNOON

2:00 P. M. Auto sight-seeing trip around Rochester Parks and Boulevards. Compliments of Rochester Branch and manufacturing plants. If you are on hand promptly in front of Convention Hall it will aid the committee very materially. Thank you.

EVENING

7:00 P. M. Banquet at Hotel Seneca. Good entertainment (Movette); dancing up to 12 o'clock.

EXHIBITS

Celluloid Zapon Company New York City—Lacquered and enameled hardware, representing various hardware finishes, produced with their goods. **J. B. Ford Company,** Wyandotte, Mich.—Wyandotte cleaning products. **Maas & Waldstein Company,** New York City—Samples of lacquered and enameled metal goods, representing various finishes, produced with their materials. **Oakley Chemical Company,** New York City—"Oakite Products" also samples of hardware in different finishes, all cleaned with "Oakite" Materials before plating and finishing. **Smith-Richardson Company,** Attleboro, Mass.—Tumbling barrels. **Scobell-Miller Company,** Rochester, N. Y.—Buffs, polishing wheels, buffing and polishing compounds and plating chemicals. **E. J. Woodison,** Detroit, Mich.—Buffs, polishing wheels, buffing and polishing compounds and plating chemicals.

Join the American Electroplaters' Society

A Plea for Understanding and Support

By JOHN E. STERLING, Supreme Secretary

The coming convention of the A. E. S. at Rochester, June 30-July 1, 2, 3, 1920, offers a grand opportunity for the employers of platers or their representatives to meet with the members of this Society, and find out the great benefit it is to the employer as well as to the plater himself. The meetings are open to all, and anyone has the privilege of taking part in all discussions on any paper presented, whether he be a member or nonmember, employer or employee. Of course, only duly accredited delegates are permitted a voice and vote in legislative matters. Otherwise all are welcome. It will give these persons who may have an erroneous idea that this society is a sort of labor union an opportunity to convince themselves that such is not the case, it is purely educational. I would especially urge the plater who is not a member to attend if he possibly can, and learn at first hand just what the possibilities are and of what vast benefit it would be to him in his vocation, and incidentally to his employer.

I believe also that it would be to the advantage of the average employer to send his plater to the coming meeting whether he is a member or not, because, al-

though we have our Monthly Review in which are published papers on the various subjects connected with electro-plating, finishing, coloring, electro-chemistry, etc., and formulas for the various solutions used in the plating, polishing and lacquering rooms, yet, it is only by attending the meetings of the society at which these papers are presented and discussed by the ablest men in the profession, and having the opportunity of asking questions, do we get the most good out of them, and the best rewards for our membership.

It is self-evident that this society has been of great benefit to the trade at large, when we consider the limited field its membership is drawn from, (practically one man in a factory) and its wonderful growth from a mere handful of men (about 15 or 20) in October, 1909, in the City of New York to the present membership of about 850, having branches in 19 different cities scattered throughout the United States and Canada. There must be something in it because it surely does appeal to the plater, as no other organization of platers has in the past. As we all know, there have been organizations of platers in the past that have fallen by the wayside, because they did not appeal to him, because the average man was looking to improve his condition, and only through education in his craft could he do so. That was the feature that was lacking in all of them, until the present organization was formed. And I wish to say here, that great credit is due to those men who had the courage to start the "ball rolling." Just stop and think, you old timers; just imagine a lot of platers in the old days getting together and exchanging opinions and ideas, talking about the formulas, and solutions they were using and helping one another out of trouble. Contrast this with the old conditions of secretiveness and jealousy which the old timers indulged in, without getting very far advanced in their trade, with the present conditions, and then realize that the A. E. S. was the agent that brought about this hail-fellow-well-met condition of sociability. The fact that a great many branches have fully equipped laboratories open to all members, and also conduct classes in chemistry, teaching the fundamentals of plating, the whys and wherefores, which we are all so anxious to know about, has been a great factor in bringing these conditions about. The chemistry is taught in a plain, simple, practical manner in language which all can understand, dealing with electro-chemistry only, giving the plater the knowledge he needs and wants.

As knowledge is power, come to our convention, see how knowledge is gained, then get some of that power.

Aluminum in Airship Construction

By ERNEST V. PANNELL, the British Aluminum Company, Ltd.

Before the war the principal materials used in aircraft work were steel and wood; the development of the dirigible called for a strong light framework of great size, and aluminum alloys were developed to meet the case. It will be remembered that the frame of one of the earliest British dirigible airships, the "Mafly," tested in the year 1911, was largely constructed of the patent heat-treated alloy "Duralumin," and although the balloon was somewhat of a failure, this was not due to the material employed. Some of the more superstitious connected it with the ambiguous name given to the vessel.

When the first Zeppelin airship was destroyed in England in 1915, sightseers, hurrying to the scene of the wreck, were met by a merchant retailing at twenty-five cents each genuine souvenirs of the airship in the shape of small pieces of the structural shapes used for the framework. Analysis of these samples revealed the fact that alloys of the following average composition were used for the tension members:

Aluminum	90%
Copper	0.75
Zinc	8.00
Manganese	0.35

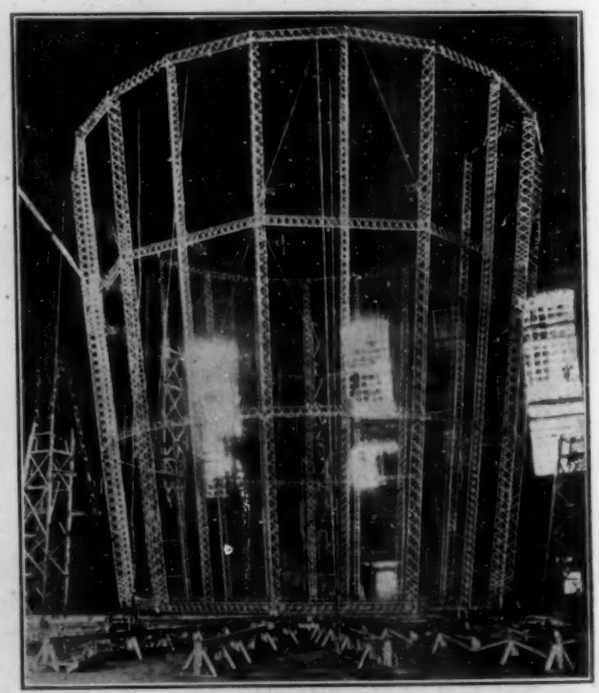
with the usual 1% total of Iron and Silicon. There is little doubt that this alloy was heat tempered. Pure 99% aluminum was used for the struts in the framework as it would be as strong as the alloy in compression.

The latest development of the airship is well represented by the British vessel R34, which will always be remembered as the first dirigible to cross the Atlantic and an interesting photograph of part of the structure is shown. The material used is Duralumin, the patent of the builders of the airship, Vickers, Ltd. of Barrow-in-Fwiness, England, the average composition of the alloy for structural purposes being

Aluminum	94.0%
Copper	4.0
Manganese	0.6
Magnesium	0.6

Aluminum of at least 99% purity is employed, and the alloy is extruded into the requisite angles and channels.

The ordinary worked alloy of the above composition would probably have a tensile strength of 35,000 pounds per square inch, but by heating the sections to 500° C.,



DURALUMIN GIRDERS FOR R-34.

quenching and aging, a tenacity of over 50,000 pounds is reached with an elongation of 15%

From the nature of the stresses coming upon such a framework as this it may be concluded that there is hardly any limit to the employment of aluminum structural shapes, tubes and wire. No steel or bronze of any kind can show the same tenacity per unit weight as these new tempered alloys.

The Protection of Automobile Parts

The Automobile Industry and the Prevention of Corrosion of the Steel in the Finished Product

Written for The Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

The automobile industry and its allied industries have reached a point of production where it is truly said that they are among the greatest of the world's industries. If we look back even only two decades it requires no great stretch of the imagination to realize that wonders have been accomplished in the automobile industry from its beginning to its present high development and tremendous production. The auto truck industry is another tremendous factor in world production, and even now is only in its infancy. Before another decade has passed we shall find auto trucks carrying our products from every section of the country to distributing points; raw materials to the mills, finished products to the markets, foods to the markets, and waste eliminated in the more rapid and greater distribution of perishable goods that heretofore have rotted or spoiled due to the slowness of present transportation facilities, between the producer and consumer.

The old adage says that "a chain is no stronger than its weakest link." This aptly applies to automobile construction. If there is one weak point in mechanical or electrical construction, the value of an automobile or an auto truck can be rated by that weak point, and the weak link I refer to is the finish of many automobiles. They look splendid when displayed in the show rooms. The car is tried out; it has the power, the electrical control, and all that pertains to a modern car; it is sold.

All goes well in fair weather, the finished parts on the car seem just as good as the manufacturer and salesman said they were, and then comes the storm. The car is drenched. It is put into the garage and the next morning all the beautiful nickel plate trimmings are covered with rust, even parts covered with enamel showing indications of rusting. The owner wonders, but he does not know the real cause of the rusting, so he sets about to clean them and he finds that rust can be removed only by friction. The metal polish can is resorted to and the rusted parts are polished that they shine like new again.

A few days of fair weather, and the storm again. The owner finds his pretty nickel plated parts are again rusty and so he repeats his cleaning operations, and this continues until within a short time the nickel plate has all been removed and in the place the bare steel remains, which looks unsightly and rusts at every indication of moisture.

The owner awakes to find that he has been deluded; that many times the finish of an automobile is, like human beauty, only skin deep.

Such defects, however, can be readily overcome. The purpose of this article was to bring these defects to the attention of the automobile manufacturer who prides himself on his product. The writer is one of those dissatisfied customers, and knowing the plating industry, feels that the time has arrived when standardized methods of protection of steel parts in a finished car should be adopted: the nickel, silver or other plating should have some sort of a guarantee, even as the silver plating industry guarantees the amount of silver deposited upon its product when a reliable article is purchased.

In March, 1917, a conference was held at the Bureau of Standards in Washington, D. C. Its purpose was the discussion of the most efficient method of protecting steel from atmospheric corrosion in the production of materials for the army, navy and aviation departments, as we were then at war. Officials of these various branches of the Government were present, a member of the Bureau of Standards, representatives of commercial industries, producing materials for the Government; representative members of the American Electro-Platers and American Electro-Chemical Societies, and several of the Engineering Societies.

It was finally decided by the consensus of opinion that zinc, when applied to a steel or iron surface by any of the commercial methods of application in vogue gave the greatest protection against atmospheric corrosion. Of the several methods now used in the application of zinc, whether the molten, sherardized or electro-deposited, the last gives the best results, because the zinc can be more evenly distributed over the steel surface without danger of any change in the steel, that frequently occurs when the temperature of 700 degrees Fahr. must be used in applying molten zinc or the sherardizing method. The latter method is a vaporizing method; the zinc impregnates the steel when the articles are enclosed in an air tight steel or iron cylinders with zinc dust, and the temperature of the cylinder raised by external sources to the vaporizing temperature of zinc. But, as stated, the deposition of zinc by the electro-plating method is the most efficient and effective, as no change occurs in the nature of the steel so treated, because the maximum temperature used in the cleansing and plating operations does not exceed 212 degrees Fahr., the boiling temperature of water.

In nearly all automobile plants plating departments are maintained in zinc plating operations. No change of equipment is needed, presuming that the facilities are equal to a doubling of the parts that may be nickel plating. Zinc entails an extra operation in electro-plating. In all its details, therefore, this would mean electrical equipment, cleaning facilities, and extra tank equipment to take care of the extra deposition of zinc upon all exposed parts used in a car. The operation might even go so far as to plate the bodies before enameling if a more nearly perfect product is required.

The details of extra equipment are problems for the electro-plater or the engineer of the plant to decide. But as soon as the automobile manufacturer commences to deposit zinc upon the exposed steel parts of his cars, then just so soon has he reached a higher standard in his finished product, and he can guarantee the plated parts against rust and atmospheric corrosion.

Every engineer knows, as does every chemist, and every electro-plater should know, that the common term galvanizing is coating steel with zinc by immersion of the steel in the molten metal. The reason for its application is the protection of the steel which is less positive, at the expense of the zinc which is more positive metal, and which is slowly corroded until it reaches a point due to atmospheric influence where no further corrosion of the metal ensues. So in a like manner electro-deposited zinc will protect the steel, and is eliminated only when constant friction or mechanical reduction due to constant polishing finally removes the zinc from the steel surface entirely.

Zinc plated steel when finally polished somewhat resembles nickel plate. The surface is not as hard, so it is more easily kept clean with less abrasive materials than even some of the commercial metal polishes con-

tain. Common floated whiting and kerosene oil mixed to a paste, applied and finally polished with a cloth, will produce a lustre with very little reduction of the metal itself.

Ninety-nine per cent of the automobile bumpers used upon automobiles today are nickel plated, but they rust in no time, and the labor of polishing the nickel plate to keep it looking bright soon removes the nickel entirely, leaves the steel unsightly and frequently covered entirely with rust. One manufacturer of auto bumpers has come to the realization that electro-deposited zinc gives a more satisfactory article to his customers, and he can guarantee it to be rust proof. There are a hundred parts on an auto that can be plated with zinc, nuts, bolts, hub, caps, steering posts, tension springs for radiator, hoods, oil cups, screws, spark plugs, wind shields, top supports, etc. Even if such parts are finally enameled or nickel plated, the protective coating beneath the enamel or nickel plate is still a great factor.

The nickel plating of zinc has been a source of great difficulty, but when the correct type of nickel solution is used, the difficulty is reduced to a minimum. As steel is the important factor in automobile construction, I shall give two formulas, one for zinc plating of steel, and one for the nickel plating of zinc. As previously stated, every plating department has facilities for the cleansing of steel parts and polishing and plating, so zinc plating becomes a part of the manipulations as used in silver, copper or nickel plating steel.

Formula for Zinc Plating

Water	1 gallon.
Sodium Cyanide, 98%	7 ounces.
Zinc Cyanide, 55%	8 ounces
Caustic Soda, 76%	4 "
Soda Ash, 58%	2 "
Aluminum Sulphate	½ "

The temperature of the zinc plating solution should be maintained at 110 to 120 degrees Fahr. The voltage 3 to 6 depending upon whether the plating solution is a still or mechanical solution. The amperage should be figured upon a basis of 15 to 20 per square foot of surface area. Anodes of pure electrolytic zinc should be used. When cast anodes are used, the incorporation of one or two per cent of aluminum in the zinc gives a better deposit. The aluminum may reach a maximum of 5%.

Formula for Nickel Solution for Plating Zinc:

Water	1 gallon.
Double Nickel Salts	8 ozs.
Sodium Chloride	4 "
Citric Acid	½ "

Temperature of solution 80 degrees Fahr. at 3 volts. Anodes of cast nickel should be used, 98% pure. The nickel can be deposited direct upon the zinc, but for high lustre the zinc plated steel surface should be lightly polished before nickel plating to avoid excessive polishing of the nickel plated zinc surface afterwards. It should also be understood that when a highly polished zinc surface is desired upon steel the steel must have a basic polishing accordingly. The formula given for nickel plating zinc can also be used very well in nickel plating the die castings which are now used extensively in the automobile industry.

Metal Plating

Part 5. A Compilation of Tables Showing the Time Required to Deposit a Given Thickness of Lead. Also, a Few Remarks About the Value of Lead and Lead-Antimony for Protection of Iron or Steel Against Corrosion*

Written for The Metal Industry by W. G. KNOX, Associated with the Chemical Laboratory of the Western Electric Company, Inc.

For several years the question of substituting another metal in place of zinc for protection of the surface of iron or steel against corrosion has occupied the minds of many chemists and finish experts. The investigations have covered a wide range of subjects and there are many cases of improvements, particularly in processes for the application of metals which have been made available for general use.

Metal coatings on iron may be divided into two classes. The first class are those metals which protect by virtue of their electro-positive nature, and the second class, those which protect the underlying metal only when applied as a continuous non-porous coating. These are known as the electro-negative metals. The first class may be called inhibitors or rust, being represented by the metals: zinc, aluminum, etc., and the second class may be called accelerators inasmuch as they promote the formation and development of rust when in contact with iron and where the latter is in the least exposed. Examples of this class are copper, silver, tin, nickel and **lead.**

Very few, if any, commercially applied electro-deposited coatings are so perfect that they do not have some very fine pin holes due to one or more causes. These pin holes will develop very quickly into potential rust spots with the electro-negative metals, whereas they do not show this tendency with electro-positive coatings.

Some investigators studying lead have believed this metal might be made to assume quite valuable protective properties not previously existing. Such a scheme, if successful, would undoubtedly be of great benefit to that part of our commercial life engaged in this class of work, but the fact that the original order of things has not been seriously disturbed would lead us to believe that the investigations have not led to the results expected.

Lead belongs to the electro-negative class with respect to iron and because of this it must be applied in an absolutely unbroken coating to give satisfactory protection. That is, it must not have even the smallest of pin holes or cracks, otherwise corrosion of the iron will proceed at these points at a rate much greater than otherwise would be the case. One objection to lead coatings is the extreme softness and much attention has been given to hardening such coatings so they will not be easily marred. Most of the shops turning out articles coated with lead add some other metal such as antimony to increase the hardness. Antimony is electro-negative to iron, hence the total protection given by its addition may be said to occur through the hardness imparted to the coating.

The writer has tested a great number of lead and lead-

*For Parts 1, 2, 3 and 4 see THE METAL INDUSTRY for June, 1919; August, 1919; January, 1920, and April, 1920, respectively.

TIME REQUIRED FOR A THICKNESS IN INCHES OF LEAD (DIVALENT)

CALCULATED ON THE BASIS OF 100% CATHODE EFFICIENCY

HOURS MINUTES AND SECONDS

CURRENT DENSITY: AMPERES PER SQ. FOOT	AMPERES PER SQ. INCH	.0001	.0002	.0003	.0004	.0005	.0006	.0007	.0008	.0009	.001	.002	.003	.004	.005	.006	.007	.008	.009	.010	.020
1	.007	:41	1.22	2:03	2:45	3:26	4:07	4:48	5:29	6:10	6:52	13:43	20:35	27:26	34:18	41:10	48:01	54:52	61:44	68:36	137:12
2	.014	:21	:41	1:02	1:23	1:43	2:04	2:24	2:45	3:05	3:26	6:52	10:17	13:44	17:09	20:35	24:00	27:26	30:52	34:18	68:36
3	.021	:14	:28	:41	:55	1:09	1:23	1:37	1:51	2:04	2:18	4:34	6:52	9:08	11:25	13:44	16:01	18:16	20:33	22:50	45:40
4	.028	:10[17]	:21	:31	:41	:52	1:03	1:13	1:24	1:35	1:43	3.26	5:09	6:52	8:35	10.18	12.00	13:44	15:27	17:10	34:20
5	.035	:08[14]	.17	:25	:33	:41	:49	:57	1:05	1:13	1:23	2:46	4:08	5:32	6:55	8:16	9:39	11.04	12.27	13:50	27:40
6	.042	:06[12]	:14	:21	:28	:35	:41	:48	:55	1:02	1:09	2.18	3:26	4:36	5:45	6:52	8:00	9:12	10:21	11:30	23.00
7	.049	:05[10]	:12	:18	:24	:30	:36	:41	:47	:53	:59	1:58	2:51	3:56	4:55	5:54	6:53	7:52	8:50	9:50	19:40
8	.056	:05[10]	:10[18]	:16	:21	:26	:31	.36	:41	:47	:52	1:43	2:35	3:26	4:18	5:10	6.02	6.52	7:43	8:36	17:12
9	.063	:04[8]	:09[16]	:14	:18	:23	:28	:33	:38	:41	:46	1:32	2:17	3:04	3:50	4:34	5:20	6:04	6:50	7:40	15:20
10	.070	:04[07]	:08[14]	:12	17	:21	:25	.29	:33	:37	:41	1.22	2:04	2:44	3:25	4:08	4 49	5:28	6:09	6:50	13:40
15	.105	:02[25]	:05[34]	08[12]	:11	:14	:17	.20	:23	.26	:28	55	1:23	1:50	2.28	2:46	3:13	3:40	4:08	4:50	9:40
20	.140	:02[05]	:04[07]	:06[11]	:08[14]	:10[18]	.13	:15	:17	:19	:21	:42	2:04	1:22	1:43	2.04	2:25	2:44	3:05	3:23	6:46
25	.175	:01[40]	:03[18]	:05[32]	:06[38]	:08[15]	:09[22]	:12	:14	:15	:17	:34	:50	1:06	1:23	1:50	2:07	2:12	2:39	2:46	5:32
30	.210	:01[33]	:02[27]	:04[07]	:05[34]	:06[42]	:08[15]	:09[28]	.11	.13	.14	:28	:41	:54	1:08	1:21	1:35	1:48	2:02	2:16	4:32
35	.245	:01[11]	:02[21]	:03[31]	:04[05]	:05[53]	:07[02]	:08[12]	:09[25]	:10[36]	:12	:24	:35	.48	:59	1:10	1:22	1 36.	1:48	1:58	3:56
40	.280	:01[05]	:02[03]	:03[05]	:04[06]	:05[08]	:06[10]	:07[15]	:08[14]	:09[16]	:10[18]	.21	:31	:42	52	1'02	1:12	1:22	1:33	1:44	3.28
45	.315	:00[57]	:01[52]	:02[45]	:03[41]	:04[25]	:05[30]	:06[35]	:07[32]	:08[35]	:09[36]	:20	:28	:38	:46	:56	1:05	1:16	1'25	1:32	3 04
50	.350	00[50]	:01[38]	:02[33]	:03[12]	:04[05]	:04[55]	:05[45]	:06[35]	:07[26]	08[15]	.17	:25	:34	:41	.50	.58	1:08	1:17	1:22	2.44
GRAMS PER SQUARE INCH		.0187	.0374	.0561	.0748	0935	.1122	.1309	.1496	.1683	.1870	.3740	.5610	.7480	.9350	1.1220	1.3090	1.4960	1.6830	1.8700	3.740

ATOMIC WEIGHT OF LEAD ---------- 207.2

SPECIFIC GRAVITY OF LEAD ---------- 11.4

ELECTRO-CHEMICAL EQUIVALENT OF LEAD --- .00107

NOTE — TIME BELOW 11 MINUTES GIVEN IN MINUTES AND SECONDS, 11 MINUTES AND ABOVE GIVEN IN HOURS AND MINUTES

TABLE SHOWING RATE OF DEPOSITION OF LEAD FROM DIVALENT SOLUTION.

antimony coated samples of iron and without exception it has been found that, compared with an equivalent coating of zinc, the above metals do not offer the same protection and it is perfectly reasonable to expect that they will not.

It has been asserted by some that the application of a preliminary coating of lead, tin or copper to iron, followed by zinc, would be beneficial. This scheme may possibly have some advantages, but from a strictly theoretical basis it would appear to be poor practice.

It would possibly be better from a corrosion standpoint to apply zinc first and follow with one of the other metals. In this way marring or scratching the outer coating would not alter the protective value of the underlying zinc.

LEAD-ANTIMONY PLATING SOLUTIONS

The deposition of lead or of lead-antimony from salts of these metals is not a difficult proposition. In fact it is one of the easiest of the electro-plating processes. Coatings of almost any thickness can be deposited from the fluo-borate or the fluo-silicate solutions; furthermore, combinations with antimony can be made to give an alloy coating of a desired percentage with proper regulation of the current and the electrolyte. The following chart has been prepared which will illustrate this point quite clearly.

All deposits were obtained from solutions maintained at normal room temperature which was approximately 20° C.

The anodes used in each experiment were forty per cent antimony and sixty per cent lead. It would obviously be necessary to make some adjustment in this ratio for work on a commercial scale.

The various types of baths used for lead plating are to be found in recent works on this subject. Practically all of these baths permit a fairly high current density to be used; they are easily regulated and the cathode efficiency is high. However, as above explained, there is little advantage to be gained, from a corrosion standpoint, with a lead coating in place of the well-known and uniformly satisfactory zinc plate.

The table shown in this issue indicating the time necessary to deposit various thicknesses of lead is applicable to all solutions commonly used in depositing this metal. To compensate for the normal cathode losses in plating it will be necessary to add ten per cent to the standard figures of time shown in the table.

The next metal plating table will show calculations for the deposition of tin.

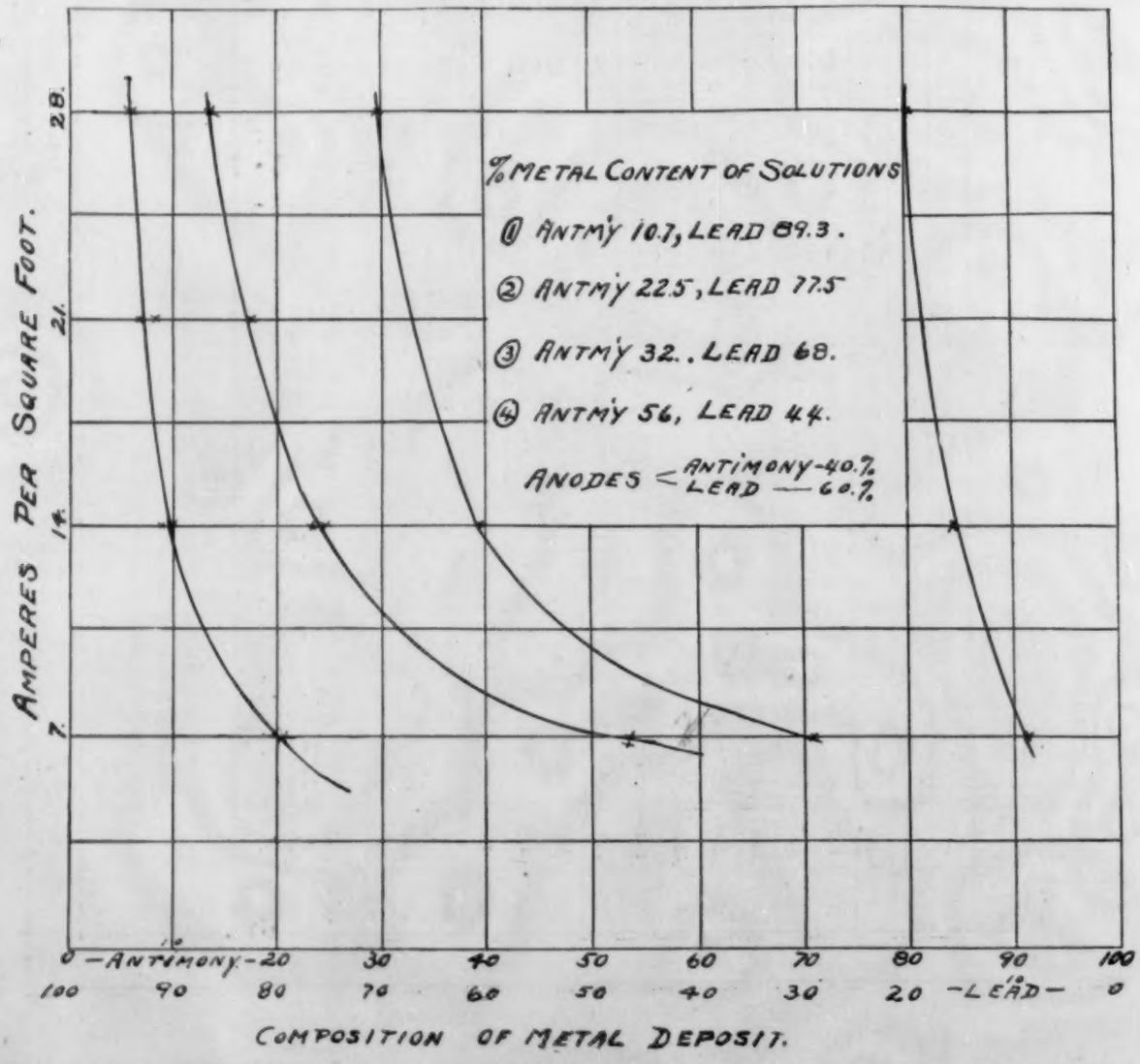

AMPERES PER SQUARE FOOT.
28.
21.
14.
7.
% METAL CONTENT OF SOLUTIONS
① ANTMY 10.7, LEAD 89.3.
② ANTMY 22.5, LEAD 77.5
③ ANTMY 32. LEAD 68.
④ ANTMY 56, LEAD 44.
ANODES < ANTIMONY-40.% LEAD — 60.%
0 —ANTIMONY— 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 —LEAD— 0
COMPOSITION OF METAL DEPOSIT.

CHART SHOWING STRENGTH OF ELECTROLYTE IN TERMS OF METAL CONTENT AND PER CENT OF METALS DEPOSITED AT VARIOUS CURRENT DENSITIES.

Plating and Polishing Factory Floor Plan

In laying out and making plans for a new factory a drawing to scale should be made, showing the correct position of doors, windows, street and yard entrance points and the location of sewer and water pipes.

The floor space and shape of all the different machines which are to be installed should be compiled and cards made to scale should be cut out to be used as models to locate the proper position of each machine on the plan.

After a careful study of the articles which are to be manufactured has been made and the different operations required to make and complete the manufactured product has been determined, the factory should be laid out so that the raw material can be brought in to a store room located at a point where the first manufacturing operation begins, and arrange the different machines in such manner that the article will pass in a natural rotation from point to point until it arrives a completed product at the packing and shipping department ready to deliver to the customer.

In requesting our suggestion about the proper arrangement of the factory here illustrated, we could have been more helpful if our correspondent had given us more complete details about the article he proposes to produce, and had indicated points such as doors leading to the street or shipping point and had given the floor space occupied by the different machines, but we have tried to make the most of the data given.

The plan given shows a factory floor 135 ft. long and 40 ft. wide with the entrance door at each end and at the left of the plan.

The office and packing room combined occupy a space at one end 35 ft. x 40 ft. The main factory is 100 ft. x 25½ ft. The polishing room 50 ft. x 14½ ft. The plating room 35 ft. x 14½ ft., and the wash room 15 ft. x 9 ft.

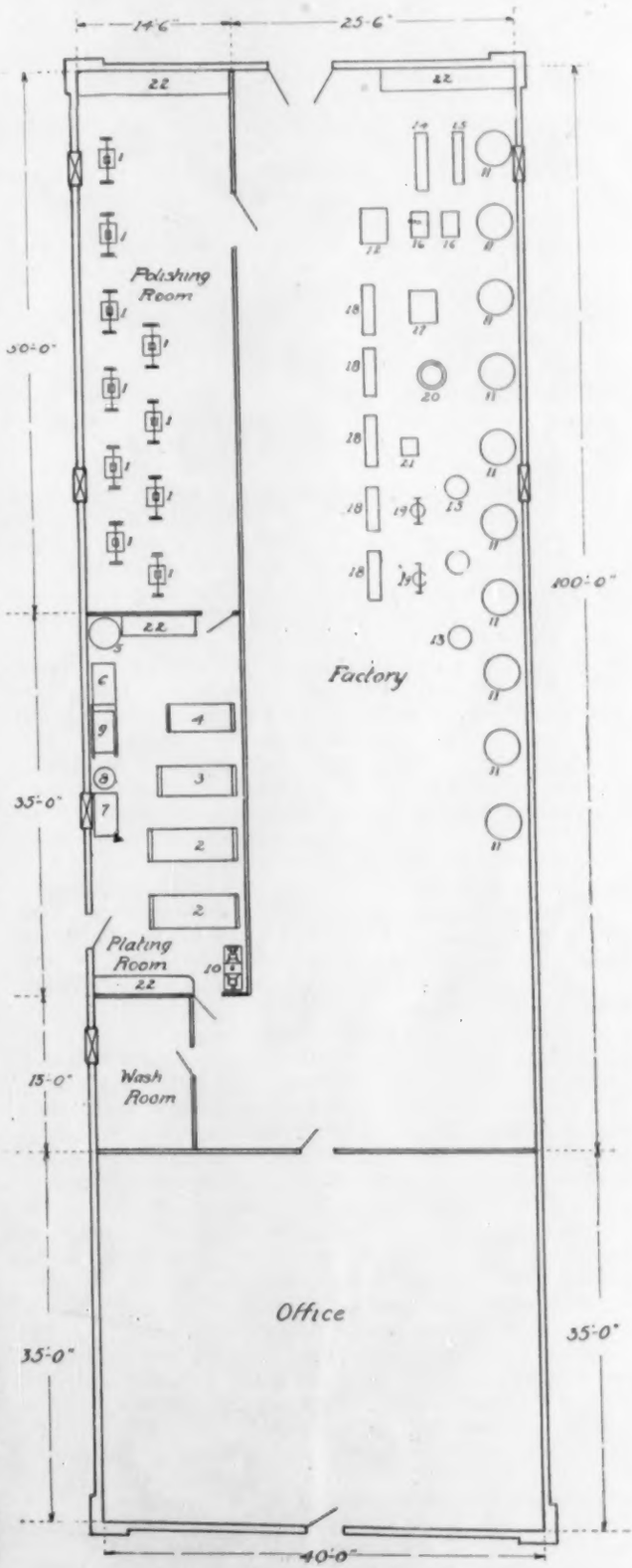
The following numbers are used to identify factory equipment:

No.		No.	
1	10 Polishing Lathes	12	1 Punch Press
2	2 Nickel Tanks—900 gal.	13	3 Spindle Drill Presses
3	1 Copper Tank	14	1 Engine Lathe
4	1 Brass Tank	15	1 Speed Lathe
5	1 Boiler	16	2 Milling Machines
6	1 Lye Tank	17	1 Shaper
7	1 Sawdust Box	18	5 Screw Machines
8	1 Hot Water Barrel	19	2 Grinding Machines
9	1 Cold Water Tank	20	1 Band Saw
10	1 Plating Generator	21	1 Hack Saw
11	10 Drill Presses	22	4 Work Benches

Referring to the plan the 5 screw machines (No. 18) should have been set at a slight angle instead of in a straight line to permit the rods of metal to be placed in each machine without coming in contact with the adjoining machine.

A line of main or driving shafting should be located in the center of the building if it is proposed to drive all the machinery with one large engine of motor, or a driving unit for each department can be arranged with each driving shaft located near the point where the power is used.

This arrangement gives ample space for increased equipment and could be changed to conform to modified routing of work. C. G. B.—A. P. Munning & Company, N. Y. City.



TYPICAL LAYOUT FOR PLATING PLANT.

Abrasive Paper and Cloth

Their Manufacture for Use in Polishing Metals

Written for The Metal Industry by PETER W. BLAIR, Mechanical Editor

The manufacture of abrasive cloth is a more extensive and interesting process than would be inferred from an inspection of the finished product. There are large quantities of this material used in the finishing of metals and a large number of manufacturers use coated polishing wheels, disks and straps with different abrasives.

The manufacturing process is divided into three parts. First comes the production of the abrasive, second the application of the abrasive to the cloth, and third the cutting of the coated stock into strips, squares or disks.

Emery in the early days of the grinding industry was used for polishing and grinding metals, but other materials have been developed possessing superior cutting qualities and are now largely employed in the cutting of metals as well as for other purposes. Emery, however, is a very tough abrasive and is unexcelled for some grinding operations. For example it is effective when a very fine finish is required or for making very hard fine wheels, such as are required for ball grinding. Emery is obtained from Naxos (an island in the Ægean Sea) from the vicinity of Smyrna in Asia Minor, from which it derives its name, Turkish Emery, and also from Chester, Mass. The value of emery as an abrasive depends upon the percentage of crystalline aluminum oxide which it contains, as this is the only element in emery that is hard enough to cut metals effectively. Although emery is a tough abrasive it contains quite a large percentage of non-cutting elements composed of amorphous alumina, silica, iron oxide and other metallic oxides. Analyses of emery obtained from the different localities mentioned show the following percentages of crystalline alumina: Naxos emery 63 per cent; Turkish (Smyrna) emery 57 per cent; Chester emery 55 per cent.

Corundum which has come into extensive use is an abrasive which contains a much larger percentage of crystalline alumina—the element that does the cutting—than emery. Corundum is easily distinguished from emery by its lighter shade. It is found in Canada, India, Brazil, and in the United States in Georgia. The percentage of crystalline alumina found in corundum obtained from the different sections mentioned is approximately as follows: Canadian corundum from 90 to 95 per cent; Georgia corundum, 77 per cent; Brazilian corundum, 76 per cent; Indian corundum, 73 per cent. In Canadian corundum iron oxide is as low as 1¼ per cent (and it is the most objectionable impurity in emery), compared to 25 per cent in Naxos emery. Corundum is harder than emery and therefore the abrasive grains will remain sharp longer. The Canadian corundum is mined in Eastern Ontario, where there are very large deposits. The corundum occurs in hexagonal crystals imbedded in feldspar, syenite, chlorite, and occasionally in some other non-metallic minerals. Only the crystals are used, all of the feldspar and other foreign matter being removed by crushing the material and passing it over concentrating jigs and tables and magnets.

The abrasive known as carborundum is not a natural product but is produced artificially in the electric furnace. Carborundum is a trade name for carbide of silicon. The principal materials used in its manufacture are coke and sand, the coke being used to supply the carbon and the sand the silicon. The crystalline formation of these elements is brought about by subjecting the mixture of coke and sand to a temperature of 7000 degrees Fahr. To this mixture is added a quantity of sawdust in order to make the mixture porous, thus allowing the gases to escape freely. About thirty-six hours are required for the heating period, when the furnace is cooled and crystalline masses of carborundum are crushed and reduced to individual crystals or grains, which are carefully washed, dried and graded through screens of different mesh, thus obtaining different sizes.

Crystolon is another electric furnace product which in recent years has been adopted in polishing departments for use on brass and all metals and materials of a low tensile strength. It consists of carbide of silicon in crystalline form. Coke, sand and sawdust are used in its manufacture. These materials after being carefully mixed together are heated in a temperature ranging between 1820 and 2250 degrees C. (3308 and 4082 degrees F.). There are other abrasives which are artificially manufactured along the same lines to take the place of Turkish Emery, namely Carbolite, Aloxite, Adamite, Alowalt, Boro-Carbone, Carbo-Alumina, Carbolon, Carbowalt, Corex, Corowalt, Oxalumina, Rex, etc.

After the abrasives are crushed and the impurities have been removed as far as possible by chemical and mechanical processes, the crushed grains are graded by passing them over reciprocating wire screens of different mesh. These screens not only have a reciprocating motion, but are inclined slightly, so that the abrasive grains are fed down the incline. The screens are composed of sections of different mesh and varying from fine to coarse from the feeding end, so that the grains are graded as they are fed along and fall through the openings. The coarser screens are made of wire and those for very fine numbers are made of silk cloth. The oversize stock which is too coarse to pass through the coarsest screen falls off at the extreme end and is recrushed. Uniform grading is secured by close regulation of feed, by keeping the screens in perfect condition and by regular testing of the graded material. This testing is done at frequent intervals by means of small testing machines equipped with master screens.

The methods of grading flour emery or other abrasives adopted by different manufacturers do not exactly agree, the numbers differing somewhat for the finer grades.

The path or routine followed in the manufacture of emery cloth from the time it is unwound from the roll at one end of the machine until it is again wound at the other after being coated by the abrasive is as follows: First the stock passes between circular rolls which print on one side the name of the company, the kind of abrasive used and its number. It then passes between two rubber rolls, the lower one of which is immersed in a tank of hot glue. The coat of glue which is deposited on one side of the cloth is next spread evenly by a narrow brush which extends across the stock, and has a very rapid reciprocating movement. Just beyond the brush there is a hopper from which an even stream of abrasive falls upon the stock; the latter then passes under a steel roll which forces or imbeds the abrasive grains into the glue, holding them firmly on the stock. The paper or cloth next passes over an elevated drum and is then gathered up into loops or rolls about 12 feet long by an endless chain mechanism, which at regular intervals carries a wooden cross bar up under the sheet as it feeds out. Then one of these sticks upon which one of the loops is suspended is conveyed along by a slow intermittent motion so that the first coat of glue will have

time partially to dry before the next coating operation. This intermittent motion is obtained from a framework that extends above the track and moves back and forth. The stroke of this frame is about 12 inches and with each forward movement pawls on it engage the cross bar upon which the loops hang and push them forward a distance equal to the frame. On the return stroke the pawls simply lift and glide back over the sticks, and then glide back and engage another set on the next stroke. As the result of this intermittent movement the loops of cloth swing to and fro as they gradually move along.

The cloth, which has partially dried, passes through a second glue-coating process. This is known as "sizing." The glue is much thinner than that used for the first coat and is applied to fill up the interstices between the abrasive grains and hold them more firmly in place. The coating process is practically the same for paper and cloth, except that the cloth stock requires two passages through the coating machine, one for coating with glue and another for coating with both glue and emery. A preliminary coat of glue is necessary, because the cloth absorbs more glue than the paper. The large rolls of coated stock are cut into various shapes such as may be required in different lines of manufacture. Circular disks such as are used on disk grinders are cut by two different methods. Small and medium sizes are blanked out in a press equipped with dies, whereas large disks are cut by shearing wheels, which impart a circular shape to a square of stock that is rotated about a central pivoting device. Owing to the varied use of abrasive cloth at the present time many odd shapes are required, such as small circular pads, convex belts for special finishing machines, etc. The production of these irregular shapes involves the use of special tools and constitutes an important branch of emery cloth manufacture.

Since the armistice practically all the Turkish Emery ready for shipment at the various exporting points has been exported to the United States and England. Prospects as to the future exploitation of mines and emery extraction are unfavorable; labor and means of transportation are scarce and extremely expensive.

It is reported that on the basis of present rates of transportation the exploitation of emery mines on a prewar scale is entirely out of the question, and according to the statement of a representative of the leading exporters of emery no work of developing will be undertaken for some time.

Emery sold before the war at prices ranging from $14.50 to $19.50 per ton f. o. b. shipping port. At present, shippers demand $44 to $58.50, and at these figures cannot supply the demand.

The Trade Origin of Two Valuable Alloys

Written for the Metal Industry by R. E. Search, Metallurgist.

Some years ago the cane and umbrella metal handle trade made use of a good grade of tin alloys for the manufacture of their handles; but the advancing price of tin compelled them to look around for a cheaper alloy. Lead alloys containing two parts of lead, one part each of antimony and tin were resorted to with the hope that they might answer the purpose. In actual use such alloys were found to be too brittle for the service required; either the melting practice in making the alloy was unskilful, or there was an excess of antimony in the composition. In the finer grades of handles the trade was compelled to go back to the more expensive Nickel Silver alloys, upon which the profit was much less.

The next alloy that came up for consideration was another lead alloy, composed of one part of lead, three parts tin and one part of zinc, which was later improved by turning to a tin-nickel alloy. It was composed of sixteen parts of tin and ten parts of nickel. Iron was seldom added as a constituent. In use of the tin-nickel alloy, it was found that the presence of so much nickel had the tendency of adding a yellowish tinge to the handles in the course of time, and this effect brought this composition into disfavor.

Many of the later alloys introduced had a strong leaning toward Britannia metal where they contained from ninety-five to ninety-seven parts of tin, twenty-four parts of antimony, three parts of zinc and five parts of bismuth.

An alloy containing tin, eighty parts, antimony seventeen parts, and copper three parts proved to be especially resistent to tarnishing and readily workable under lathe and chasing tools.

In looking back over the development of the alloys used in the handle trade, with the exception of those made from the noble or semi-noble metals, the metal tin has been used as the chief constituent. One of the most highly esteemed alloys in the trade contains forty parts tin, fifty parts zinc, three parts copper, and one part iron.

A class of handles for which a high price could be demanded and obtained was that used in the making of them for ladies umbrellas and riding stocks. These required a lighter alloy, by weight, which would give sharp, clean and beautiful castings, susceptible of a high polish or a splendid Roman finish, without being essentially more costly to manufacture.

This demand developed and was met by the two new alloys, Ziskon and Zisium. The first alloy was composed of from three to four parts of zinc to one part of aluminum. R. E. Barnett states that it contains about one fourth part of aluminum, although this amount may be varied by some of its users for special purposes. Its specific gravity is about 3.4, it has a texture, fine-grained like that of steel, but not so hard. Cast in sand it has a tensile strength of about eleven tons per square inch. In cutting it should be run at a slower speed than Zisium, and it gives a long clean shaving.

Zisium is an alloy closely allied to magnalium; it contains zinc, tin and copper with a trace of antimony. Its principal component is aluminum. It has a density of about 2.95, and a tensile strength of about five tons per square inch. It cuts like soft brass, in short curly chips.

The making of both these valuable alloys requires considerable mechanical and metallurgical skill. In some cases the castings show, now and then, dull brown or deeper toned gray oxide films which are removed with great difficulty, but this tendency could be avoided if the alloys are properly made. Especially beautiful telling effects may be secured with either alloy by roughening the surface by stamping methods, and these surfaces may be deadened or brightened or given an antique finish at will. Where a harder surface is desired than that afforded by Ziskon, a small amount of manganese may be introduced in the composition of the alloy without detracting from the physical properties or the lustrous beauty of the alloy. The metallurgical processes and methods of making these beautiful alloys are of the utmost interest, but the space at our command will not permit their description here.

The Keeping Properties of Varnish Products

How to Store Varnish, Enamels, Lacquers and Japans*

By E. J. COLE, Chief Chemist, Hilo Varnish Company, Brooklyn, N. Y.

Varnish products are made to be used, not to be kept, but frequently one is asked how this or that product will keep and one ought to know. A careful consideration of the facts in this article will help avoid troubles which annoy all of us.

There are two phases to the subject:

1. Keeping varnish products in their original unopened containers.
2. Keeping varnish products in opened containers, partly filled containers, dip tanks, etc.

These are two distinctly different conditions. In the first, our product is not in contact with the oxygen of the air, and we have only to consider the effect keeping has on the various products and on the container.

Clear varnishes and japans which do not contain pigment, are in no way injured by keeping in original unopened containers. In fact they are usually slightly improved in depth of gloss and flowing. It is not necessary for the customer to stock up, to get this improvement as the requisite ageing has been done before leaving the factory. I heard the other day of several cases of varnish in the original packages for 40 years which were in good condition when opened.

Enamels and japans made with light pigments (light in specific gravity) are in no way injured by keeping, and very little stirring will make them as uniform as on the day that they were packed. But these goods must be stirred.

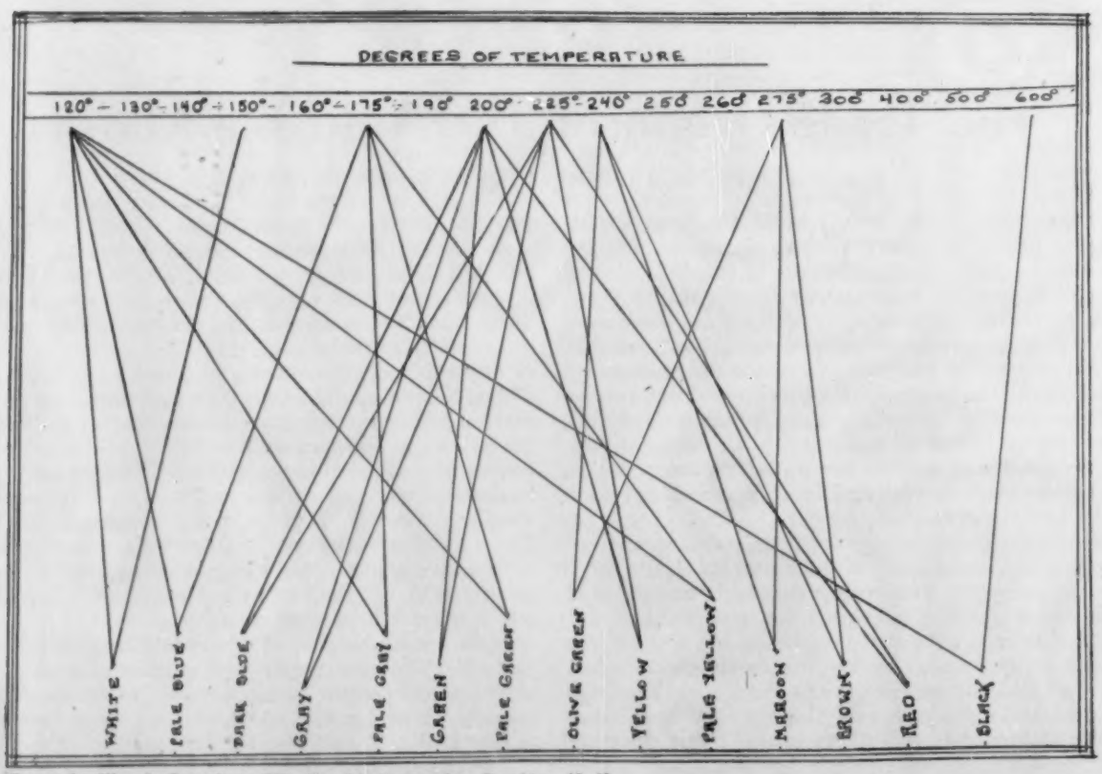
For this reason all pigment goods are shipped in containers in which stirring is easily accomplished. That's why we use stirrer barrels and stirrer drums. True, some products if used up fast enough might not need the stirrer, but it is safer and better shipped with the stirrer.

Enamels and japans made with heavy pigments are in a class by themselves. These heavy pigments settle badly and sometimes cake at the bottom. As a rule, such goods are made heavy bodied or semi-paste. In that condition settling is retarded. In this class are many first coaters, paste woodfillers, iron fillers, and enamels made with iron oxides. These products are in good shape to use when they leave the factory. But several months' storage allows a settling that is quite appreciable and six months' standing makes them very bad.

It is true that some products such as flat first coaters have to be made of heavy pigments and the user should not be encouraged to stock too heavily. Materials in this class cannot be shipped ready for use without getting in trouble, as when thin in body, the settling would be very quick.

The containers in which a product are shipped govern how long it can be kept. Cans of goods kept in a cool dry place will remain in good condition years. As it is hard to keep a place cool and dry, day in and day out, the amount stored should not be excessive. Wooden

Baking Enamel Chart



Drawn by Wm. J. Cummings, Hilo Varnish Corporation, Brooklyn, N. Y.

*From the Hilo World, April, 1920.

barrels, on the other hand, will not keep in good condition indefinitely. Six months is about as long as a wooden barrel will stay tight without recoopering. This is under good conditions.

Packages, whether cans or barrels, should not be subjected to severe cold or be stored near steam pipes or be alternately wet and dry. Even the best of barrels when standing too long develop leaks. Goods in steel drums will keep the same as in tin cans.

The minute that a container is opened, the contents are exposed to the air and the process which makes the goods dry on the "work" starts to take place according to the amount of this exposure. The volatile thinners tend to evaporate and the drying oils tend to oxidize. It is best wherever possible to avoid having opened containers of unused varnish products around too long. Sometimes this can be done by buying in packages that fit a job or a unit of work or of time. For example: A quart of automobile finishing varnish is enough for one car.—A five-gallon can may be as much as a small shop uses per day. A customer who uses only 100 gallons per year should not buy in barrels.

All partly filled containers should be tightly corked or plugged when not in use.

Quick drying varnishes are more affected by exposure than japans which require baking to harden them.

Some varnishes will skin and this skin must be carefully removed. Others will on quite some exposure, especially when reduced, get cloudy as though they were "broken." This is due to the oxidized oils becoming insoluble in the rest of the varnish.

Baking japans are the least affected by exposure and are only apt to thicken by loss of "thinners."

Pigment enamels and japans act like the clear products except that the pigments must be kept in suspension.

The following is quoted from Bulletin No. 3, page 10:

"White enamel undercoats, when reduced for dipping, should not be permitted to stand unused day after day in poorly covered and partly filled dip tanks. They should be drawn off and stored in air-tight containers."

This applies to all undercoats. In fact, to any product used in a dip tank.

Too often a good product is spoiled before it is all used up, and such loss should be avoided.

Shellacs and spirit copals should not be kept in tin or iron containers more than a few months as they would gradually darken until useless. Colored spirit copals are not shipped out in steel drums, as they attack the iron of the drum so fast as to change color before the customer could receive the shipment.

In cases where spirit goods are apt to be kept any length of time, the proper containers are: glass jars, jugs, wooden kegs, and wooden barrels.

Shellacs and spirit varnishes when exposed in an opened container, thicken by the loss of the alcohol which can be replaced.

BRONZE BANK DOORS

A unique and attractive product of artistic skill is shown in the new bank that has been recently finished in Austin, Texas. The president of this bank is Major G. W. Littlefield, a wealthy stockman, whose ranches embrace 400,000 acres of land. In order that old time ranch scenes might be perpetuated and that he might have something in the way of a monument to his own industry and success, Major Littlefield caused to be made at Tiffany's two solid bronze doors, which are located at the main entrance of the bank.

These doors weight 1,300 pounds each and cost $4,000. Each door is divided into three panels, there being delicately cast upon each panel an allegorical scene upon the Yellow Horse ranch of Major Littlefield. These scenes were designed from actual photographs taken for the purpose. The upper panel of each door shows typical mounted cowboys. The middle panels represent a round-up of cattle on the ranch, and a third a grazing scene, Solid bronze steer-heads, with bronze rope encircling each neck, are located upon the doors where the knobs or knockers are ordinarily placed.

SOLID BRONZE BANK DOORS.

SECONDARY TIN RECOVERED IN THE UNITED STATES IN 1918

	Short tons
Tin recovered as pig tin	7,142
Tin recovered in alloys and chemical compounds	16,695
Total	23,837
	Long tons.
Quantity of clean tinplate scrap treated, including 6,680 tons imported in 1918	166,838
Quantity of old tin coated containers treated	15,090
	Pounds.
Quantity of metallic tin recovered at detinning plants	2,220,288
Tin content of tin tetrachloride, tin bichloride, and tin oxide made at detinning plants	4,365,810
	6.586,098

CORRECTION

In our May issue, on page 220, we gave the consumption of copper by American Electrical Works and Phillips Insulating. We are in receipt of a letter from the Phillips Wire Company stating that these two are distinct and separate corporations and have no relationship whatever with each other.

Spoon and Fork Blanks

Defects in Manufacture and Their Causes in English Practice*

By J. A. MORTON

Mr Morton said that nickel silver, of which the majority of spoons and forks are made, was admirably adapted to the purpose, being in the finished product white and hard and nearly approaching silver in appearance. It is therefore universally substituted for the rarer metal in cases where cost is a consideration, and as a basis alloy on which to deposit silver by electrolysis it was in very large demand by hollow-ware manufacturers.

One of the greatest troubles of the nickel silver spoon and fork manufacturer was the periodical recurrence of what is known as "fire-cracking." Such metal at every successive reheating left a certain number of blanks which had to be rejected for cracking. These cracks are often so fine that they are not evident until the next stage of rolling has been carried out (which process naturally opens and extends the crack). As a result of many years' experience and much investigation, Mr. Morton noticed that the cracks always developed at a low heat, and if all such cracked blanks could have been removed at that stage, the further heating of the balance of blanks would reveal no more failures. A further crossrolling of the latter, however, would result in a proportion of failures at the next annealing stage. It was natural to conclude that the cracks were due to some variation or faulty annealing, but a variation of each factor in this annealing process did not confirm this theory. He admitted a great variation of opinion among practical men as to the best temperature of annealing, but was satisfied that the best results were obtainable with a temperature of 800°. This temperature he had effectually checked by "Sentinel" pyrometers. The method often adopted of raising the temperature to 600° C. and allowing to "soak" for a considerable time, did not, in the lecturer's opinion, give as malleable a product as by the method he advocated. The blanks after annealing should be cooled in the open air.

To obviate the losses due to fire-cracking, Mr. Morton annealed the metal under various conditions, by the soaking method mentioned, by very slow heating from charging in a dead-cold muffle, by rapid heating to both medium and very high temperatures. No such modification materially reduced the percentage of wasters. "I have," said the lecturer, "been led to trace the matter of firecracks further back than any of the processes to which the metal is subjected in the manufacture of the blank and place the responsibility on the presence of impurities present in the original metals or scrap." One of the most curious results observed was that with the same materials, where failures resulted, the firecracking increased with the nickel content. He had worked with 20% nickel content metal for years (using a particular brand of B.S. copper), without any trouble arising, but when this particular brand was unobtainable, this was substituted by another brand. Immediate recurrence of firecracks resulted, which continued so long as such copper was used and gradually died down when the first brand was returned to. He was not unnaturally led to the conclusion that the trouble was more directly, or mainly, connected with the constituent metals than with the annealing so he proceeded to work on that basis.

It was, he said, far better to rely on one's own results than upon a verbal guarantee of purity of the metals so sold. He told how on one occasion, he submitted the copper to analysis and found ten times the recognized limit of bismuth present. The firm supplying the metal promised to take it back and send a better grade, but it never arrived. On another occasion material bought ready for use in sheet form showed a large percentage of firecrack failures and the firm supplying the metal asked to have a consignment of blanks to test. These, duly marked, were sent and in course of time an equivalent number of perfect spoon blanks were returned, but the tell-tale mark only appeared on a few of them. It was afterwards admitted that others had been substituted for those that failed! "Subsequent requests," facetiously remarked the lecturer, "for demonstrations of a like character have been declined with thanks."

During the war when the supply of metals was restricted by the Ministry of Munitions, one had to fall back on cupro-nickel scrap. Trouble with nickel silver became general and whilst bowing to the inevitable it but confirmed the speaker's conclusions as to the influence of impurities in the original alloy. When electrolytic copper and Mond nickel again became obtainable, Mr. Morton thought all his troubles would end, but he found still a considerable proportion of wasters. The only variable not satisfied was the spelter. As the zinc available was restricted to one brand at that time, an analysis was made, with the result that a percentage of 2.5 lead was shown. Quoting Prof. Gowland, who deems 0.10% lead as the limiting allowance for cold rolled and hard worked copper alloys, the cause of the failures was again traced to the impure basis metals, since on returning to their original brand of zinc (containing only 0.06%Pb.) the fire-cracking entirely disappeared and, with such careful selection, the present production is satisfactory. Indeed, it was with some difficulty that he was enabled to induce fire-cracking with their present spoon metal, so as to obtain samples for the photographs which follow. He was thus led to the conclusion from these exhaustive tests that failure was directly due to impurities in the original purchased metals or alloy and, so far as he had gone, traceable more particularly to such impurities as have a low melting point, like bismuth and lead.

Scientific investigation on the effect of impurities on alloys in which zinc and copper predominate has been restricted almost entirely to the alloy brass. It is, however, generally admitted that "Nickel silver may be regarded as a brass containing nickel in solution;" it may be assumed that the effects of impurities as stated for brass can be accepted as applying equally to nickel silver; indeed, from the lecturer's experience, this effect would appear to be intensified, since the susceptibility to such impurities seemed to increase with increasing nickel content.

According to Law "lead does not alloy with brass, but separates out in the form of globules and films between the alpha crystals, a condition which necessarily weakens the metal, and is only permissible

*A special report of a lecture delivered before the Sheffield Section of the Institute of Metals, at which Mr. W. G. Turner presided.

when strength is of secondary importance." Neither antimony nor bismuth form solid solutions with copper or brass. Hence when the metal or alloy freezes, an initial crystallization of the bulk takes place, but the low M.Pt. impurity remains liquid until the temperature has fallen to the particular freezing point of the impurity, e.g., 327° for lead and 268° for bismuth, forming a supporting network to the copper or copper-zinc crystals first formed. Consequently each crystal grain of the brass is separated from its neighbour by a thin brittle or weak film and when the alloy is rolled the interstitial layers, if they do not flow at the same rate as the bulk metal, may open as cracks. It is not, however, at the rolling stage that the greatest trouble from this source would seem to occur. Indeed the lecturer was of the opinion that such impure material appeared to be more ductile as judged by the "cross volting" test. The difference between blanks made from commercially pure and impure metals seems to be most marked in the subsequent annealing operation. The former can be drastically treated with impunity, but with the latter, the presence of traces of low melting point impurities bring in a condition of weakness in which the cell walls can no longer support the stresses during the process of warming. As in the casting of the alloy we have the impurities remaining liquid to the last, and finally solidifying between the crystals, so inversely in annealing, a point is reached at which the impurities are in a soft, a plastic or even a molten state, and the presence of the slightest strain is enough to cause the metal to crack. If we imagine the alloy as something like a cobweb of impurity, the cells of which are filled by crystal grains of the solid solution mentioned earlier in the paper, it is easy to see that in whatever direction a stress exists, it must cut a line of weakness and fracture results along such line. Another point which may have a significant influence on the tendency to crack is that mentioned by Dr. F. C. Thompson (who confirmed an earlier observer working on brass), that nickel silver as the temperature rose, up to a certain point showed increasing hardness, and having reached a maximum at about 350°C., fell away with further rise of temperature. This change in hardness is obviously accompanied by a volume change, which influences the internal stresses, and if positively, then a further tendency to crack is added. Again it may be noted that this change is approximately that of the melting points of the two impurities named—lead and bismuth.

Nor is this tendency to crack on the appreciation of heat confined to the rolled condition. The process of stamping confers a hardness upon the metal which is an asset from the buyer's point of view, but it must be borne in mind that such are liable to crack during any process in which the temperature is raised beyond a certain degree. Thus the substitution of machine grinding for hand filing in trimming the edges has been a contributory cause in the production of cracked blanks; the heat generated by such grinding with emery wheels is greater than in the older method, and given impure metal referred to above, the wastage at this stage becomes alarming. The impression of the maker's mark on the spoon leads to considerable local stresses, and as the boundary of such mark may almost coincide with the edge of the metal, the author has seen many cases of cracks radiating from such marking.

There are, however, certain conditions in which nickel silver will crack during heat treatment even when made from pure materials. If, for example, the alloy is made of all new metals, i.e., without scrap, the resulting metal will, both during rolling of the ingot and the cross rolling, crack badly when annealed. On this point Mr. Morton thought that the cause of such cracking was to be found in the cored crystals, that the alloy had, due to chilling, not attained equilbrium conditions and suggested that a substantial annealing before rolling would cure such cases. A second example of this failure of pure alloys is very curious. If a rolled and annealed ingot require a very small reduction to bring it down to specification, involving say one or two "light passes," the ingot will invariably crack on annealing. If, however, the ingot is first cut up into strips, the strips anneal perfectly.

Referring to a paper given last year to the Institute on "Casting and Rolling Problems," speaking of fire cracks, Mr. W. G. Turner made a sketch of a cross-rolled blank, showing cracks as usually starting from the junction of the straight and cross rolled portions. From the speaker's experience, however, this was not correct, the usual positions being as shown in Fig. 1.

When the tendency to crack is highly developed, they appear at the junction, but entirely enclosed, as will be seen in Fig. 2.

This article will be concluded in the July issue.—Ed

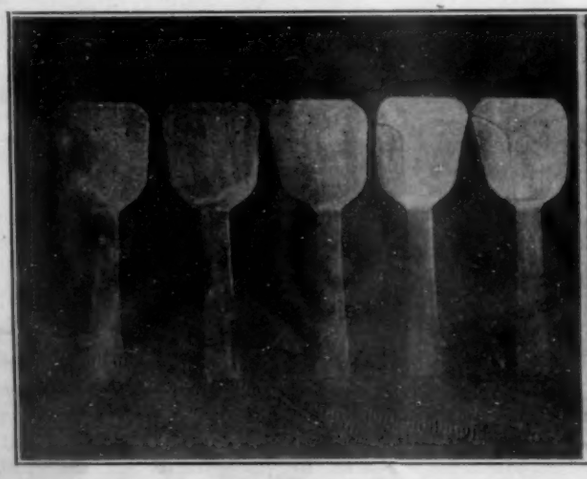


FIG. 1. CRACKS STARTING IN CROSS ROLLED SECTION.

FIG. 2. CRACKS DEVELOPING IN JUNCTION.

Brass and Bronze Castings

A paper presented at the Spring Meeting, St. Louis, Mo., May, 1920, of The American Society of Mechanical Engineers.

By CHRISTOPHER H. BIERBAUM, Buffalo, N. Y.

The terms "brass" and "bronze" are not as definite in their meaning as might be desired. The term bronze was formerly applied to an alloy of copper and zinc. Usage, however, has changed and it is now generally applied to an alloy of copper and zinc. This change of nomenclature has led to a great deal of confusion. Even today we speak of crankpin, crosshead, or engine brasses when we have bronzes in mind; that is, a copper-tin alloy with comparatively little, if any, zinc in its composition. In general, it may now be said that without a modifying adjective brass is an alloy of copper containing a large amount of zinc; and bronze is an alloy of copper containing a relatively large amount of tin.

2. It is very generally understood that in designing machine parts which are to be made of cast materials a larger factor of safety is necessary than that required for rolled or forged material, although the compositions may be very similar or even identical. This in itself is not sufficient. The fact that the strength in any given casting varies in its different parts must also be taken into consideration, since it is impossible to make a casting with varying sections of uniform strength.

3. In general, the engineer should be cautioned against specifying alloys upon which he has only such knowledge as has been derived from laboratory tests alone, since it is impossible to determine, by ordinary experiment, all of the economic conditions which enter into the founding and tooling of a casting and the requirements of a subsequent satisfactory use of an alloy for any given service. To illustrate: Years ago the favorite Government composition known as gun metal (88 per cent copper, 10 tin and 2 zinc) was unreservedly specified for valves, steam connections and fittings. At the present time, however, no successful valve manufacturer would think of using this and similar high-tin alloys may appear to meet the requirements. The safe procedure is either to investigate and follow standard practice, or determine definitely why it should not be followed; or else, to leave the composition and the guarantee of results to a responsible manufacturer and hold him accountable.

4. Aluminum should never be used in an alloy which is to be tight against leakage of either a gaseous or fluid substance. Aluminum has the peculiar property of forming a characteristic skin upon the surface of its alloys, due to its great affinity for oxygen. Appreciably less than one two-hundredths of one per cent of aluminum produces an appearance upon the surface which is very distinctly that of a brass or bronze casting. In fact, this surface film is often found in castings where the amount of aluminum present is so small that the chemist may be in doubt as to whether even a trace of it exists. In pouring a casting containing aluminum this surface film becomes entrained in the convecting currents as the molten metal fills the mold and often extends through the entire thickness of the wall of the metal and thus gives rise to porosity which causes leakage. For the foregoing reasons it is always desirable, when pouring, that the molds should fill with as little bubbling and splashing as possible. This applies to all alloys in general, but to those containing aluminum in particular. The "horn gate" or some form of gating by means of which the molten metal enters at the lowest point in the mold is very desirable.

5. In the alloying of copper and tin a low-fusing crystal forms known as the tin-copper eutectoid. This crystal is hard and brittle and in general should not be present in bronzes used for machine parts; and more particularly so if these parts are subjected to temperatures approaching that of high-pressure steam. This crystal always forms in ordinary foundry practice when tin is present in amount equal to 9 per cent of the copper content. In slow cooling the amount of this crystal is increased and slow cooling also causes it to appear with a lower percentage of tin. High-tin bronzes should neither be used under high temperature nor where they are subjected to severe shock. Without doubt this utectoid crystal constitutes the most valuable bearing crystal for bearing metals to be found in any of the bronzes.

6. Considerable experimental work has been done at different times and in different laboratories on the subject of heat treatment of foundry bronzes and brasses which are to be used with subsequent forging or tooling. These experiments have been applied particularly to the copper-aluminum alloys and to the copper-tin alloy known as gun metal. Nothing, however, has as yet developed to bring this process of heat treatment into general commercial importance.

DEOXIDIZERS

7. **Magnesium** has a strong affinity for oxygen. It corrodes quite readily when exposed to moist air. It is the most natural deoxidizer for zinc. It is also very useful for deoxidizing copper in the making of pure copper castings requiring a high electrical conductivity. Unlike many other deoxidizing agents, a slight excess of magnesium will not materially reduce the electrical conductivity.

8. **Aluminum** also has a very strong affinity for oxygen, ranking next to magnesium in this respect. It is an excellent deoxidizing agent in all alloys where it is intended that it should be present. It produces a characteristic surface which is not adapted for soldering.

9. **Manganese** has a high affinity for oxygen, ranking next to aluminum in this regard. It is supplied commercially as manganese copper, which contains about 30 per cent of manganese. It is not only a deoxidizing agent when alloyed with copper but it is also a desulphurizer. When used in copper castings a mere trace greatly increases their electrical resistance.

10. **Zinc** is very generally used for alloying with copper. In its affinity for oxygen it ranks next to manganese but, owing to its high affinity for copper and its tendency to form a solid solution, it is not as good a deoxidizing agent as might be expected.

11. **Silicon** has considerable affinity for oxygen when present in the molten state of an alloy. It is supplied to the trade in the form of silicon copper, a product of the electric furnace containing from 10 to 50 per cent of silicon. It became very popular as a deoxidizing agent in the brass foundry some fifteen years ago, but has largely been replaced by phosphorus for this purpose owing to the convenient form in which the latter is sup-

plied. Silicon has the disadvantage that it cannot be used in any alloy containing lead, owing to its tendency to unite with lead and cause porous and spongy castings.

12. **Phosphorus** is now most universally used in the brass foundry as a deoxidizing agent for copper. New copper can be melted in a crucible and complete deoxidization effected with one-tenth of one per cent of phosphorus. It has the disadvantage, however, of reducing the electrical conductivity wherever it is used. The phosphorus-copper crystal (PCu_3) is very hard and a very small percentage of phosphorus tends to harden any of the alloys in which it is present. If bronze containing more than a trace of phosphorus is to be used as a bearing metal, it should also contain an appreciable amount of lead in order to minimize the abrasive character of the phosphorus-copper crystal.

13. **Boron Suboxide.** When this compound was first introduced it was the most successful deoxidizing agent for copper, in that not a trace of boron remains in the deoxidized copper, and the effect is exceedingly good, making a pure deoxidized copper with high electrical conductivity. It has recently been superseded, however, by boron carbide, which is even more active as a deoxidizing agent. Both require skill and expert knowledge to handle successfully in the foundry.

FLUXES

14. The use of fluxes in the brass foundry is of considerable importance. If pure metals could be melted without coming in contact with air, fluxes would not be required and therefore it is essential that proper fluxing be resorted to. Covering the surfaces of the molten metal with charcoal is always beneficial, that is with metals and alloys whose melting temperature is above that of the ignition point of the charcoal.

15. The function of a flux is twofold: first, it should dissolve in itself all the metallic oxides; and secondly, when in a molten state it should completely cover the surfaces of the molten metal and thus exclude all air. A good flux should not be too destructive on the walls of the furnace or crucible. Satisfactory castings may be made by melting pure metals in a crucible and covering with charcoal. In the remelting of gates, risers and skimmers which have been more or less oxidized, it is necessary to use both a deoxidizing agent and a flux. The best two fluxes known are probably borax and fluorspar. The first of these is too expensive for ordinary foundry use. The second, when pure, is too severe upon the walls of crucible and furnace. Various fluxes are now on the market containing, in part, fluor-spar and an admixture of other materials which tend to reduce the destructive action of the fluor-spar upon the furnace and crucible walls. Broken glass is often used and is quite satisfactory, especially of of a low fusing temperature. Glass, however, has also a destructive action upon the crucible and furnace walls, so that the fluorspar mixture fluxes upon the market are the best for the purpose.

16. Brass-foundry products do not compete directly with cast iron, cast steel or steel forgings in machine construction. They are specified by the designer only when certain properties are necessary, such as appearance, bearing value, chemical composition, and the like. These non-ferrous products never can compete directly in cost with the ferrous products for the reasons that copper is always higher-priced than iron and the price of tin is always subject to foreign speculation; while few of the minor constituents compare favorably in price with iron.

BRONZES

17. **Manganese Bronze** is the term generally applied to a composition which, properly speaking, is a brass instead of a bronze. It is an alloy of copper containing a high percentage of zinc, aluminum and iron, in which a small amount of manganese has been used. The beneficial effects in this alloy, due to the deoxidizing and iron-carrying properties of the manganese, are very striking. Beneficial results are obtained even though no more than a mere trace of manganese finally remains in the resulting product. In none of the brass-foundry products are the high merits of an alloy so much due to the results of skilful and intelligent foundry practice as in the case of this particular alloy. The composition is relatively cheap when the cost of its constituents is considered. The cost of the final product, however, is much higher than its composition would indicate, due to the following requirements necessary for the production of satisfactory castings: The introduction of a small percentage of iron is necessary for proper results, and care and skill with proper equipment are indispensable for this operation; secondly, the amount of metal required for gates, heads and risers necessary for this alloy is unusually large, so much so that in the production of ordinary automobile castings only from 17 to 39 per cent of the entire metal melted finally appears in the form of finished castings; and lastly, the loss in melting is unusually large. For machine construction this alloy, of all brass-foundry products, is of first importance. In strength it successfully competes with steel castings and steel drop forgings, although the price is from three to five times that of malleable castings. This, and its non-corroding properties make it a most desirable material in automobile and marine construction. As a foundry product it is a very desirable material, as it has a very smooth surface. The labor for finishing it is in many cases so light compared with that required for finishing steel castings that it can often compete with steel castings. This is especially true in automobile construction. It has the necessary strength for brackets, standards and fixtures, so that it can replace both steel castings and forgings for these purposes. Manganese bronze has a field of usefulness in experimental work in that it can be produced with less delay than steel forgings, stampings or malleable castings, requiring as it does so little finishing. By varying the two principal constituents of manganese bronze the desired physical characteristics can be obtained. An increase of the percentage of copper increases its elongation, whereas an increase in zinc increases its ultimate tensile strength but decreases its elongation. When this material is made up with the necessary precautions as to purity and foundry methods, very excellent commercial results can be obtained. For example, a tensile strength of 90,000 lb. per sq. in. with 30 per cent elongation can be secured in a standard test coupon, whereas many producers consider 65,000 lb. tensile strength with 15 per cent elongation as fair.

18. **Aluminum Bronze** is an alloy of copper and aluminum containing from 4 to 11 per cent of aluminum and the remainder copper. In recent years, however, this alloy has been made up with an addition of from 1 to 6 per cent of iron. The introduction of iron produces twofold results: First, it causes the alloy to solidify with smaller crystals, that is, it produces a finer grain; and secondly, it adds a third hard crystal formed by the union of aluminum and iron which is much harder than the other two crystals. This is the only brass-foundry product which can compete commercially with manganese bronze. With care it can be so made up as to have a somewhat higher ultimate strength than manganese bronze, although it does not possess a higher yield

point or elastic limit. The drawback to this alloy is the inherent difficulty of making solid castings. The tendency to have blowholes is very characteristic and even extreme skill will overcome this difficulty only in a degree. Aluminum bronze may be used for bearing purposes, and recently, when containing iron, has had a limited use for motor-truck worm drives. The only advantage of this latter alloy over a copper-tin-bronze composition is its cheapness; for bearing purposes, however, it cannot compare with a copper-tin alloy.

19. **Acid-Resisting Bronzes.** These are some of the brass foundry products which formerly were of more importance than they are today, owing to the fact that stoneware and specially modified cast iron are now largely replacing these uses. There are, however, some uses for bronzes to resist sulphuric and sulphurous acids in mine service, pulp mills, and other industries. For these purposes two alloys are most serviceable; a copper-tin-lead alloy containing substantially 86 per cent copper, 12 per cent tin and 2 per cent lead; and aluminum bronzes containing a small iron percentage.

20. **Copper-Tin Alloys.** First among these alloys highest in its tin content may be mentioned bell metal, a composition containing from 16 to 25 per cent of tin. As the name implies, it is used for the manufacture of bells, gongs, steam whistles and the like. It is a resonant metal. For industrial purposes the compositions used are those having the lower percentages of tin, say from 16 to 18 per cent. The higher percentages of tin, especially between 20 to 25 per cent, are used for bells in which high tone quality is required. The production of these bells requires considerable skill and constitutes a special industry. In general, however, it may be said that for all purposes the constituents for these alloys should be extremely pure and every precaution against oxidation should be taken during melting and pouring, since the quality of the product is altogether dependent upon the purity of the alloy.

21. The next alloy of this type to be considered is a bronze used in turntables and movable bridges. This composition is given in the tentative A.S.T.M. specification as "Class A, Bronze Bearing Metals for Turntables and Movable Bridges." It is also given as "Grade A" in the American Railway Engineering Association specification bulletin of July, 1918. It contains 20 per cent of tin, and phosphorus not to exceed 1 per cent. It is very hard, due both to its tin and its phosphorus contents. For best service conditions it should not be used except when placed between hardened steel plates. It is intended for pressures over 1,500 lb. per sq. in. and slow-moving bearings.

22. A composition similar to the foregoing is one given as "Class B Bronze" under both of the immediately foregoing specifications and containing 17 per cent of tin with a permissible phosphorus content of 1 per cent. It does not seem wise to permit this amount of phosphorus in a bearing metal of this kind, however, if to be used as specified between "soft steel plates." Better service conditions can be obtained by the production of the necessary hardness through increase of tin content and reduction of phosphorus. An alloy containing 19 to 20 per cent tin and only a trace of phosphorus would give better service when used on soft steel. In a case of this kind where a copper-tin bronze is used between unhardened steel surfaces the amount of phosphorus present should be very limited owing to the exceeding hardness of the copper phosphide crystals.

23. The next alloy of importance as to its tin content is a bronze containing 11 per cent of tin and a maximum of 0.2 per cent of phosphorus. This alloy is the standard composition now in very general use for worm wheels in motor-truck drives and in the motor-car reduction worm gears. A feature of considerable importance in the making of this alloy seems to be that of producing the proper amount of chilling effect in the cooling of the castings. In some cases zinc has been added to an amount of 2¼ per cent; results show, however, that the addition of zinc is undesirable although it produces an additional hardness of the alloy as indicated by the Brinell and scleroscope tests. This additional hardness rather detracts from its bearing value, and, at the same time, makes it more difficult for tooling. It seems self-evident that the above alloy, as it now stands, could be improved by the addition of a small amount of lead—not sufficient to produce undue weakening—and that this would result in a threefold benefit: easier tooling, increased accuracy of tooled surfaces, and a higher bearing value.

24. **Copper-Tin-Zinc Alloy.** The most popular alloy of this class is the one known as ordnance bronze or gun metal. Its composition is 88 copper, 10 tin and 2 zinc. This alloy has come to be a very generally known composition in that it is a general-average bronze. However, with a more complete metallurgical knowledge of the relative values of different compositions, it becomes of less importance, in that it is specifically neither a bearing bronze of high merit nor a bronze especially adapted for machine parts when maximum economy of alloy is considered. The high tin content produces in this alloy a high percentage of the tin-copper eutectoid, with the resulting disadvantages when the alloy is used for other than bearing purposes. The use of ordnance bronze for the construction of machine parts is, for two reasons, a wasteful one: It contains an unnecessary amount of tin, a high-priced constituent, and more serviceable alloys can be produced by the use of a lower percentage of tin. For machine parts, steam connections and valves, a composition having, say, 90 per cent copper, 6½ tin, 2 zinc and 1½ lead is a superior alloy for the reasons that it can be produced as a more economic foundry product, its price is less, its physical properties are superior, and lastly, its machining qualities are superior. On the other hand, the zinc in ordnance bronze distinctly detracts from its bearing value.

25. **Copper-Tin-Lead Alloys.** These alloys are strictly bearing compositions containing not in excess of 82 per cent of copper and a tin maximum of 11 per cent with a lead maximum also of 11 per cent. This range of alloy corresponds to "Class C" of the A. S. T. M. tentative specifications for Bronze Bearing Metals for Turntable and Movable Railway Bridges. These alloys are usually deoxidized with phosphorus which has a tendency to suspend or diffuse the lead, since in all these alloys the lead is held in mechanical suspension without any chemical union. The most generally used of this series contains 80 per cent copper, 10 tin and 10 lead.

26. To enumerate all of the copper-tin-lead alloys given by various authorities as bearing bronzes would constitute an almost infinite series. The whole matter, however, can be summed up in a few words: Lead is a desirable constituent in a bearing alloy but has the drawback of weakening the bronzes, therefore, for light service, or under conditions where a supporting oil film cannot always be maintained, as in car or truck bearings, the compositions containing the higher proportions of lead should be used. Where the punishment is severe the alloys should have a lower percentage of lead. As a rule it is economy to use as much lead as possible, since lead is a cheaper metal and it also adds materially to the bearing value of the alloy.

27. **Copper-Lead-Tin-Zinc Alloys** are those containing from 3 to 12 per cent of lead, from 4 to 6 per cent of tin, and from 1 to 10 per cent of zinc. This series of compositions includes several used for bearing purposes, especially those having the high lead limits. The addition of zinc in this alloy is for the purpose of reducing the cost; it does not add to the value of the alloy except in its physical strength. The series includes the popular red-brass composition; 85 per cent copper, 5 tin and 5 zinc; and also a cheaper composition containing 77 per cent copper, 10 lead, 3 tin and 10 zinc, used for low-pressure valves and plumbers' supplies.

The Production of Copper Calcium Alloys

By FRIEDRICH OTTO BENSEL, in Metal und Erz, 2, 1914, p. 16

Translated for The Metal Industry by R. E. Search

Since all the chemical behavior of calcium in its deoxidation of metals appears to be especially suitable, there have been undertaken of late years an entire series of experiments in this direction (especially with reference to iron alloys). These were partly miscarried, because calcium as such is so easily oxidized. In the deoxidation of the metal bath, in consequence of its low specific gravity, calcium floats on the surface, where, mostly it is consumed by the oxygen of the air. In addition to this is its slight solubility in the elements of the metal bath which maintains this unfortunate condition. On the other hand, for well known reasons, if one uses the calcium in the form of an alloy, instead of its own metallic state, then there is obtained a homogeneous solution in the above sense. The alloy then dissolves quickly and completely in the molten metal and its reducing action within the bath occurs with better results.

The method used for the preparation of copper-titanium in the electrochemical way by using as an electrolyte a molten bath of fluorspar has shown the way of preparing pure calcium-copper alloys.

The electrolysis is undertaken with pure fluorspar, with as much copper chloride (pure $CuCl_2$ with 47.25% Cu) which, in the interval of ten minutes, would allow that the copper contained in this, according to the electrochemical equivalent, must be separated in half that time, therefore, in five minutes. Left to the amount of the work to be done by the current, perhaps one-half of the whole, its is thus that the arrangement stands for the separation of the calcium from the electrolyte (CaF_2).

The use of copper chloride—cuprous chloride—in place of copper fluoride, above all things, aims at the possibility, in the investigation, whether with copper chlorine combinations the same or still better results are to be obtained. With this especially to be considered is the circumstance that an alloy is more easily made and at lower cost than can be made with the fluoride. The experiment went well without any disturbance and with approximately complete constancy of the amperage and pressure whilst the entire time consumed amounted to five hours. The result was a material which was not completely fused together. It consisted of three parts, which were especially strongly contrasted with one another by their colors, and by that which had deposited on the copper cathode in layers, in such a manner that the part richest in copper was deposited directly at the pole, and that part poorest in copper at the periphery.

The analytical results were as follows:

1. Copper colored material, Cu=91.85%, Ca=7.81%.
2. Grayish yellow metal, Cu=67.23%, Ca=29.32%.
3. Gray, shining metal, Cu=41.38%, Ca=58.43%.

The layer separations of these different copper calcium alloys are evidence that the bath temperature at the cathode was not high enough to obtain the separation of the metal in a fluid state, which distinctly shows that during the course of the electrolysis, with reference to the separation of the calcium, that this continuity had increased up to the end of the process.

Supported by the observation further made below (with addition of $CaCl_2$), the supposition is easy to understand that this condition is to be traced back to a too violent evolution of chlorine from the added copper chloride (52.75% Cl) and by this means a consequent strong saturation of the electrolyte with the gas (active whirling of the bath). In so far as by this means, namely, a part of the already separated calcium slung off by the wave of revolution in the bath, particularly—shoved from the cathode, it was conducted across in the calcium chloride, which, however, for the separation of the calcium, acted but just favorably, as followed afterwards it showed the experiment to be feasible. The already once used fluorspar was displaced by an abundant quantity of calcium chloride (about 30% of the whole electrolyte) and the electrolysis carried out with it. In order to lessen the amount of chlorine given off cuprous chloride, CuCl (60% Cu) in place of the copper chloride, $CuCl_2$ was added.

Proportionately at the beginning it shows that the strength of the current going through the bath in comparison to that of the former experiments at constant pressure was significantly higher (550 amp. to 350 amp.) which is traceable only to a greater conductivity of the electrolyte (CaF_2+CaCl_2). Naturally it increases with it according to the bath temperatures and the fluidity of the melt which both require for the formation of a good melting, homogeneous metal alloy. Thanks to these conditions, the material brought out amounted to 1.39 kg. in two and one-half hours of the research. It was a copper calcium alloy which fulfilled all requirements sufficiently, a complete homogeneous, white and bright glittering material of the following composition:

Cu = 70.40%.
Ca = 23.32%.
Fe = 1.91%
Si = 1.921%
Total 97.55%

This alloy showed an extraordinary tendency to oxidation in the air and reacted with water in a lively manner at ordinary temperatures with evolution of hydrogen. (With dilute nitric acid it burns accompanied by sparks.) Although later a further experiment was made with the use of copper fluoride in place of the cuprous chloride, with retention of the same electrolyte (CaF_2+CaCl_2) which gave a copper calcium alloy with:

Cu = 83.76%
Ca = 14.49%
Fe = 0.76%

which furnishes an immediate favorable result; this proves however by the small quantity of calcium obtained that in the electrolytic preparation of such alloys, the addition as well of the copper ($CuCl_2$) as also the calcium ($CaCl_2$) in the form of chlorides is advantageous.

The most favorable process economically is therefore represented by the cuprous chloride and calcium chloride in an electrolyte of fluorspar and calcium chloride.

Note—It is difficult to understand why, in the first result, there should be so much iron, if the chlorides and fluorides used were as pure as they could be obtained.—R. E. Searth, Metallurgist.

Labor and Industry

An Abstract of the Address Delivered at the Convention of the American Supply and Machinery Manufacturers' Association, Atlantic City, N. J., May 17, 1920

By WILLIAM H. BARR, President of the Lumen Bearing Company, Buffalo, N. Y.

In the first part of this speech Mr. Barr explained at length the need for a greater supply of labor, and advocated that Congress repeal the literacy test for immigrants to allow a larger number of unskilled laborers to enter the country.—EDITOR.

This country is suffering from the over-regulation of business, the under-regulation of labor unions, and the indiscriminate attempts of politicians to utilize classes to foster their own political ambitions. Business men are under the careful supervision of the Department of Justice, the Department of Commerce, and the Federal Trade Commission. The Sherman Anti-Trust Law has wide ramifications. The Department of Commerce, essentially at least, is also an investigating body. The Federal Trade Commission watches all corporations carefully. Although I do not admit that this commission exercises its powers with an understanding of the fact that it was originally created to be a link between business and government, I would prefer to see business operated under limited direction of the government, with sane restrictions, than see it degenerate into a condition where it would attempt to set up its own standards, irrespective of the rights of the public. In other words, the fundamental idea of a certain amount of regulation for business is good, and such regulation is necessary. It is unfortunate that government officials often arrogate to themselves arbitrary powers, but we have the protection of the courts for a final determination of those issues. This has been demonstrated in the case of the Federal Trade Commission, where attempts at the exercise of such arbitrary powers have been checked by the courts.

If it is desirable to regulate business, how much more necessary it is that the labor unions of the country should be made responsible and subject of government control. The government regulation today is jughandled.

The business man is haled before somebody for an alleged and ofttimes imaginary infraction of the law. The labor unions, on the other hand, disturb industry, because in many fields they can produce paralysis by striking. They can tie up the railroads, the coal mines, the steel mills, the express companies. They can freeze you or starve you. They can demoralize commerce, and they seem to have the will to do all these things. But the government does not regulate, restrict, or control union labor. Congress will neither enact a law to give the Executive such power, nor would the Executive Departments enforce such a law to the limit if it were enacted, as it does enforce the restriction laws against business. Labor unions are utterly irresponsible, both legally and financially, and out of your own experience you must say that they are decadent morally. Agreements with them are scraps of paper, and where there is a possibility of coming in contact with the law we see so-called premeditated outlaw strikes, which would prevent the government from interfering with the unions, because the strikers are supposed to be insubordinate. The government, under its war powers and through the Lever Act, has a certain amount of control over certain unions. That control was first exercised in the coal strike, and you will remember in what a lukewarm manner the control was put into effect. But this, too, is a war power which will cease with the declaration of technical peace. In the meantime, the unions have learned how they can avoid the law, and the outlaw strike is a direct development of their methods. Furthermore, let me recall the fact that when the Lever Act was in process of enactment it was held up by the labor unions and only permitted to pass when agreements had been reached with certain executive officials that it would never be invoked against labor. When the Attorney General dared to invoke it, Samuel Gompers charged bad faith, and told of the agreement. That agreement, of course, was a violation of the oath of office of the officials possibly entering into it.

Is it not our duty, therefore, to urge that the unions must be put in a position where they will be responsible to the people, to the courts, to the government? Until that time comes we shall have a class autocracy attempting to dominate industry and clearly dominating politics and the industrial welfare of the country. It is our duty to see to it that a Congress and an Executive are elected who will deal equitably with business, with labor, and with the American public.

It is probable, too, that our labor, both American born and immigrants, do not altogether appreciate the wonderful opportunities that our land offers, for we have been lavish with possibilities for material advancement.

We have more than 700,000 farms under cultivation, most of them being originally government grants. We have thousands of acres of cut-over land ready to be granted, cleared and cultivated, waiting for anyone who will operate them.

We have nearly 250,000 schools and colleges where the studious ambitions of any person may be translated into development. We have hundreds of thousands of industries, employing as many separate talents.

We have 250,000 miles of railroad, and immeasurable water power, mines, factories, farms, club life, educational centers, sports, amusements, opportunities. Everybody can have everything he needs if he has the spirit of enterprise and honest effort.

Therefore, why should not our workmen, many of them being employers in the making, concentrate, not in group criticism of those who have been successful in industry or profession, but rather in a rigorous attempt to contribute their own best effort to the highest development of those resources which will help America to retain its international commercial leadership? Cannot we in groups or individually help to foster this spirit instead of that unfortunate antagonism now expressed by union labor?

In conclusion, I will quote a sentence from the utterances of Abraham Lincoln: "Capital has its rights which are as worthy of protection as any other rights. Nor is it denied that there is and probably always will be a relation between labor and capital producing mutual benefits.

"The strongest bond of human sympathy outside of the family relation should be the one uniting all working people of all nations, and tongues, and kindreds. Nor should this lead to a war upon property or the owners of property. Property is the fruit of labor; property is desirable; is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise.

"Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built."

EDITORIAL

Vol. 18 New York, June, 1920 No. 6

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW
Published Monthly
Member of Audit Bureau of Circulations

Copyright 1920 by
THE METAL INDUSTRY PUBLISHING COMPANY
(Incorporated)

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon ..... Editor and Publisher
Adolph Bregman ..... Managing Editor
George W. Cooper ..... Advertising Manager
Thomas A. Trumbour ..... Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number Beekman 404 Cable Address, Metalustry

CONTENTS

	Page
American Electro-Platers' Society Convention	255
Join the American Electro-Platers' Society	261
Aluminum in Airship Construction	262
The Protection of Automobile Parts	263
Metal Plating	264
Plating and Polishing Factory Floor Plan	267
Abrasive Paper and Cloth	268
The Trade Origin of Two Valuable Alloys	269
The Keeping Properties of Varnish Products	270
Bronze Bank Doors	271
Spoon and Fork Blanks	272
Brass and Bronze Castings	274
The Production of Copper Calcium Alloys	277
Labor and Industry	278
Editorials:	
Brass Industry Centers	279
Buying White Metals	280
Railroad Assistance	280
Payment for Services	280
Correspondence and Discussion:	
Electrification of Fuel Furnaces	281
A Tribute	281
Co-operation	282
New Books:	
Zinc and Its Alloys	282
Silver	282
Enamels and Enameling	282
Iron Age Catalogue of American Exports	282
Shop Problems	283
Patents	285
Equipment:	
Fireproof Doors and Shutters	286
Galvanizing Reinforcing Bars	286
Sheepskin Polishing Wheels	286
A New Flux	286
Fighting Fire with Fire	287
Associations and Societies	287
Personals	288
Deaths	288
Trade News	290
Metal Market Review	299
Metal Prices	300
Supply Prices	302

BRASS INDUSTRY CENTERS

In a recent article published in Finance and Industry the general statement is made that the brass and copper industry is moving westward to meet the demand. In support of this statement are the examples of mills in Detroit, Kenosha, Baltimore, Buffalo, Cleveland and Fairmont.

Although it is undoubtedly true that these mills have been built since the rise of the brass industry in the Naugatuck Valley, it would be erroneous to say that the whole industry is moving westward, for this reason alone. In the first place, the term brass and copper industry must be understood clearly. It is divided roughly into two parts, foundries and rolling mills (which include cutting up shops, etc.). That the foundries have, to a considerable extent, moved westward there is no doubt, largely in answer to the call for their products from the automobile trades. In addition a foundry is a much simpler matter to build and operate on a small scale. Hence numberless little shops have sprung up in various parts of the country in answer to even a short-lived demand. However, rolling mills are of a different order. The large installations, expensive machinery, and the great investment required caused this industry to move very slowly. The difficulty of turning out material which will satisfy the consumer is another and even greater reason so far, for the slow movement of the rolling mill industry. The Naugatuck Valley has for ever so many years been producing copper and brass of all shapes and sizes and types that the knowledge of methods and operations is almost traditional. In spite of the necessity for bringing raw products to an out of the way locality, and re-shipping the finished articles back to the west from which they originally came, the Naugatuck Valley still holds its supremacy. Whether or not this will last indefinitely is a difficult question. It is hard to imagine that the American Brass Company, The Bridgeport Brass Company, The Chase Companies, The Scovill Manufacturing Company, and others of that section will move away from New England. It is possible, of course, but so long as metal working remains a difficult art, and the old timers retain their desire to remain in the country in which they were brought up, the moving of the rolling mill industry will at least be slow.

BUYING WHITE METALS

It takes a long time for a trade to outgrow its practices. There was a time when steel was steel only occasionally, and when a buyer could not be certain of the quality of his purchase. In every field, at least for some time after it has sprung up, mysterious methods, sharp practices have existed. Eventually these are elim-

inated, first by installing checking methods, analyses, tests, etc., whereby the material can be investigated, and second by a general feeling in the industry that such practices are beneath it, and that a reputable concern should be capable of being trusted without additional checking.

One field which seems to have not yet emerged from this stage, however, is the white metal business. The uninitiated novice who attempts to buy babbitt metal on faith almost invariably accumulates a remarkable collection of mixtures and heterogeneous materials. He has two posibilities before him. He can buy on specification, or on a guarantee to do the work required. Theoretically, if he has the right formula the metal bought on specification should do the work as well as that bought with a guarantee. The fact remains, however, that the guarantee metal will probably cost as much as five cents or over per pound more than his formula metal. Why the difference? As H. S. Hood of the United American Metals Corporation stated in an address delivered before the Automotive Service Association: "A babbitt manufacturer does not and cannot make a formula babbitt with the exacting care and skill that he puts into his brand. He cannot profitably give the full time in alloying, because formula babbitts are keenly competitive, and he must cut his manufacturing cost to quote a price that will get the order.

"He cannot afford to use the purest tin, copper and antimony, and does not have to use them, because chemical analysis does not tell the goods used. There are Lamb and Flagg or Chinese tin, lower grade metals, and there are Banker or Straits tin or Billiton, which are the highest grades. A chemical analysis can never tell which of these tins is used. It does not tell whether Lake or Casting Copper has been used. It only tells the metals and their percentages. It cannot tell whether the ingredients are virgin or scrap. If, however, the manufacturer is making a brand, and has spent money advertising that brand to do certain work, he cannot afford to be careless and is going to give it all possible care and attention."

It seems a great pity that an industry as old and as standard as that of white metals, for the above excerpt applies not only to babbitts, but to solders, type metals, etc., should still be in a state where it is impossible to be sure of one's product. There are, of course, ways of discovering whether good or bad tin has been used, such as making physical tests, and chemical analysis for the impurities which occur in the lower grades of metals. However, very few buyers are willing to go to such thorough investigation on each buy of metal. The point at issue, however, is that except for some reliable houses, the buyer of white metals is still between the devil of high prices for guaranteed products and the deep sea of inferior quality for others.

RAILROAD ASSISTANCE

Speaking before the Metal Trades Association at their annual dinner, April 21, Samuel O. Dunn, editor of Railway Age, placed a large share of the responsibility for the condition of the railroads on their shoulders. He stated in part as follows:

"While legislation for the solution of the railroad problem and the return of the roads to their owners was pending, it was impracticable for large orders for equipment and materials for the railroads to be placed. In the meantime industries of other kinds were rushing into the market and placing large orders. Railroads are finding it extremely difficult to get these materials principally because the market has been so largely monopolized by the automobile and other manufacturers. The resulting condition of the material market as it affects the transportation situation, and through it the entire business situation of the United States, is one of great seriousness. If orders which have been placed for materials by automobile and other manufacturers are to be given the preference over the orders which are now being placed by the railways, and the railway equipment supply companies, it will be impossible for the railways to render adequate service to any industry in the country. If the orders for railway materials are not filled as rapidly as possible, the limitations imposed by the inadequacy of means of transportation will prevent increased production in every line of industry."

Unquestionably this is a most important charge. It is probably true that the metal trades have been catering more than ever to the automobile industry. That this has been carried to such an extent as to make other industries suffer was probably not realized by most of the men in the metal business. With this made clear, however, and with the knowledge that upholding the standards of operation and the efficiency of the railroads is not only a national necessity but a national duty, it is perfectly obvious that the railroads should have priorities, to a certain extent, in the material which they order. Just how far these privileges should go is a question of the immediate situation.

Under some conditions the railroads can be fairly well trusted to look after themselves; for example, they show little hesitation in appropriating coal intended for customers when they find it necessary. However, the obtaining of manufactured materials is not such a simple matter. It is purely a matter of self-protection for the business interests of the country to make it possible for the railroads to continue to function, and especially now when they are in such dire straits, unusual favors might be granted without charges of undue favoritism.

PAYMENT FOR SERVICES

In his letter to President Wilson, tendering his resignation as director of the Bureau of Mines, Dr. Van H. Manning wrote: "In leaving the Government service there comes to me, as it has over and over again, the thought that although this Government has spent each year millions of dollars in useful scientific work for the benefit of the whole people, the monetary recognition of its scientific and technical servants is not sufficient to enable them to continue in the service for the people. This has been especially true within the last few years, when it has been impossible for many men to remain in the Government service.

"With the marvellous expansion of the industry in this country and the growing necessity of science to industry, scientific bureaus have been unable to hold their assistants against the competition of industry in taking trained men at salaries the Government does not pay or even approach.

"I feel very deeply that there ought to be more adequate compensation for the scientific and technical men in the Government service, so that none of them may be compelled to accept positions on the outside.

"Many of these scientific men are of fine type for Government work; care little for the commercial field; take an intense professional interest in their tasks; and are of inestimable value to the Government."

It seems to us that little can be added to what Dr. Manning has stated. The situation has become acute. It is not a matter of applying the principles of economy to this department as to others under the stress of pres-

ent conditions. The technical departments in the Government service have always been operated on the basis of economy, and charges of extravagance have never been made successfully against them. Even though the immediate situation calls for retrenchment in Government expenditures, to allow the good men to leave the service, because of the better opportunities outside, is typically a penny wise and pound foolish method.

To add to this, Congress has cut the appropriation for the Bureau of Standards so that it may be necessary to dismiss a number of the men in this service at present. It is "retrenchment" of course. It causes us to wonder whether it would not be wiser to retrench in some items which are not assets to the industry of the nation, and to improve the producing departments. Would it be impertinent to suggest such a course Congress?

PLATERS' CONVENTION

The coming convention in Rochester, N. Y., described in the leading article in this issue, is one of the few affairs that no plater should miss. It is important also to the employer that his plating expert should be present at such a gathering. From all indications it seems to be a banner year.

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

ELECTRIFICATION OF FUEL FURNACES

To the Editor of THE METAL INDUSTRY:

Mr. Reardon's article on brass melting in THE METAL INDUSTRY for May is very timely and interesting; valuable, also, in that it gives cost and production figures which apparently have not been dressed for the occasion.

There are one or two points that might be considered in more detail; also, some deductions to be drawn to which the writer would invite attention.

The cheapest method of melting shown is by the use of the open flame oil furnace. Mr. Reardon discounts this by pointing out that fuel oil is rapidly becoming unobtainable, at least expensive. He does not, however, say anything about gas.

He also makes what appear to be two rather remarkable statements:

"For these reasons alone the electric furnace will eventually crowd the open flame and crucible furnace out of the foundry." "The Electric Furnace should furnish what the open flame would do if it had been handled properly."

There is nothing to hinder the proper operation of an open flame oil or gas furnace, so far as is known. Therefore, why say that the electric furnace will crowd everything else out? Presumably the electric furnace is not fool-proof and must be handled properly.

It would greatly add to the value of the figures if the composition of the alloys melted were given, also analyses of the scrap and the resulting metal. The melting loss with crucibles is shown to be 2.92 per cent. If this is zinc loss only, it is abnormally high.

Mr. Reardon does not consider the use of gas for crucible melting. By its use the labor cost could be reduced from 33 per cent to 50 per cent, bringing it to even less than the labor cost with the open flame. There would be no ashes to treat for metal, and zinc loss would be less on account of the more rapid melting possible. Crucibles would last longer on account of the lessened wear and tear.

It would also be interesting to know what the metallurgical characteristics of the metal obtained from each of the three types of furnaces were.

There has never been any question that the open flame furnace of fairly large capacity, say, 500 to 2,000 pounds, was cheaper than the crucible process, but for many alloys and for some casting conditions, and for the flexibility of the installation, the crucible method is essential. The same is true of electric furnaces. In general it may be said that the economy of the electric furnace over the crucible furnace is not because it is "electric," but because it melts in larger units or charges. Where the conditions permit of melting in large batches with standard alloys and standard casting conditions, the electric furnace may compete.

It is interesting to note from the figures given by Mr. Reardon that the investment required for a given production is over six times greater with the electric furnace than with the crucible process, being $12.80 per ton per year, as against $2 per ton per year.

THOMAS H. A. EASTICK.

NEWARK, N. J., May 28, 1920.

A TRIBUTE

To the Editor of THE METAL INDUSTRY:

I shall be grateful to you if you can find space in your estimable magazine for the few lines that I am herewith submitting. I had the great pleasure of reading the article by William J. Reardon on electrifying the Schwartz furnace. My sole desire in penning these lines is to pay my tribute to the gifted author, for his inestimable contributions that he has made from time to time to the foundry industry. In my opinion, he is the "Grand Old Man" of the aforementioned industry.

My intimate knowledge of Mr. Reardon and of his unceasing efforts to improve production, has developed my profound respect and admiration for him. I remember, it was several months ago, when Mr. Reardon told me of the idea he conceived to melt metal in a Schwartz furnace by means of electricity in place of crude oil. I never doubted his ability to accomplish it, for his years of experience in the foundry game, his thorough knowledge of metals and his ability to bring things to a favorable culmination, would make any undertaking along these lines possible. After experimenting for but a brief time, he reached results beyond all expectations. These results bear concrete proof of success in the table of figures embodied in his article, and which were compiled by Mr. Stay.

However, another individual should not be lost sight of, and whose dogged perseverance and clear grasp of mechanics enabled Mr. Reardon, in my opinion, to reach the finality with comparative ease. I am referring to John Collins, Mr. Reardon's able assistant. I have the pleasure of knowing Mr. Collins and am, therefore, aware with what energy and effort he approaches new problems. He is a characteristic American in that his vocabulary permits of no word "impossible."

Mr. Collins' success in developing the mechanical end of centrifugal and still permanent molds is on par with his achievement in replacing crude oil as a fuel, with electric current in Swartz furnaces.

My personal knowledge of these two men leads me to believe that in the near future the metal industry in general will take cognizance of the ingenuity of Mr. Reardon and Mr. Collins and acclaim them arch and pillar of our industrial enterprises.

ALEXANDER R. GOLDEN.

New York City, May 26, 1920.

Without detracting in the least from Messrs. Reardon and Collins, it seems best to correct a mistaken impression of Mr. Golden's. The test run by Mr. Stay, published in our May, 1920, issue, did not use the Schwartz furnace as an electric furnace; it was run on oil as an examination of the cost data will show. The electrification of the Schwartz furnace was simply Mr. Reardon's suggestion. As the value of a suggestion depends upon the man who makes it, there is no question that Mr. Reardon's article was read with deep interest throughout the foundry world.—Ed.

CO-OPERATION

To the Editor of THE METAL INDUSTRY:

Thanks for the check for the article submitted. Let me say I did it in the spirit of cooperation. Some poor mortal may be

benefited, for the lead trouble stumped me for a long time.

How much better it would be for all foremen and metal workers to loosen up on some of their shop secrets; better for all of us, better working conditions, more contentment. The reward due comes to all sooner or later. As it is now, some foremen have all of their shop secrets locked away in their brains, and when they die the result is confusion and trouble for their successors. The old fogy idea, such as "It cost me many years of hard work to learn and master this and I am not telling all I know to everybody," have been relegated to the scrap pile. None but the ignorant would use it. The modern day method to success in business is Teamwork, Cooperation and Harmony, which should be the viewpoint of all.

C. WILLIAM ROSENBERGER.

Toledo, O., May 10, 1920.

NEW BOOKS

Zinc and Its Alloys, by T. E. Jones, published by Isaac Pitman & Sons, 2 West 45th Street, New York City. Size 4½ x 7. Cloth binding. Price, payable in advance, $1.00.

A short compilation of material on zinc, its metallurgy and extraction from the ore to the refined metal. It includes material on the history, property, uses and sources of zinc, dressing zinc ores, calcining and roasting zinc ores, zinc smelting, hydrometallurgical processes and alloys of zinc.

Silver, by Benjamin White, published by Isaac Pitman and Sons, 2 West 45th Street, New York City. Size 4 x 6. Cloth binding. Price, payable in advance, $1.00.

This book covers silver in the same way as the volume on zinc noted above. It includes information on mine fields, extraction from the ore, marketing, manufacturing, coinage, currency and future prospects.

Enamels and Enameling, by Paul Randau, published by Scott, Greenwood and Sons, 18 Broadway, Ludgate, E. C., London, England. Size 5½ x 8½. Price, payable in advance, $5.00.

This is probably the most complete volume on enameling published. It covers raw materials, substances added to produce opacity, fluxes, pigments, decolorizing agents, testing of raw materials, subsidiary materials, preparation of materials, appliances and methods of smelting, composition of enamel masses, and masses for ground enamels, composition of cover enamels, preparation of articles for enameling, application of enamels, firing the ground enamel, application and firing of cover enamel or glaze, repairing of defects, enameling sheet metal, decorating enamel ware, specialties, dial plate enameling and enamels for artistic purposes.

The Iron Age Catalogue of American Exports, 9 x 12, 16 pp. Illustrated.

The Iron Age Publishing Company has just published The Iron Age Catalogue of American Exports, for distribution in the civilized countries of the world. It contains the catalogues of leading American manufacturers of engineering, railway, foundry and electric equipment and supplies, iron and steel machinery and tools, hardware and cutlery. In order that the foreign buyer may be adequately advised of products which American manufacturers have to offer, it is written in five control languages of the world, English, Spanish, French, Portuguese and Russian.

The catalogue contains over three thousand illustrations and is replete with specifications, data and other information which will make it useful to the technical, as well as other buyers.

RECENT SCIENTIFIC AND TECHNICAL LITERATURE

A MODEL FOR REPRESENTING THE CONSTITUTION OF TERNARY ALLOYS

Summary of Paper by W. Rosenhain, D. Sc., F. R. S., Vice-President (Teddington), presented at the Annual General Meeting of the Institute of Metals, held in London, on Friday, March 12, 1920.

The paper describes a form of model by means of which the thermal-equilibria of a system of alloys containing three metals can be represented. The use of models for this purpose is well known, but the majority of models hitherto constructed have consisted of solid pieces or blocks, shaped in accordance with the data obtained by observation, and fitted together to form a complete model. With this form of construction, however, a comprehensive view of all the various surfaces and boundaries cannot be obtained, since the inner surfaces cannot be seen through the bulk of the solid model. In the mode I described in the present paper, no solid blocks are used, but a construction of wires is adopted. The lines, curved or straight, along which the various equilibrium surfaces meet one another are first set out by means of relatively stout wires.

The paper is illustrated by means of photographs, diagrams and descriptions of a model representing an ideal ternary system of alloys, in which various typical features are represented.

REMOVAL OF INTERNAL STRESS IN 70:30 BRASS BY LOW TEMPERATURE ANNEALING

Summary of a Paper by Y. H. Moore, O. B. E., B. Sc., F. I. C., and S. Beckinsale, B. Sc., A. I. C. (London), presented at the Annual General Meeting of the Institute of Metals, held in London, on Friday, March 12, 1920.

The authors have carried out a series of experiments to determine the temperature range within which internal stress may be removed from cold worked 70:30 brass without serious reduction of hardness. Cups spun from sheet and initially in a state of high internal stress were annealed at temperatures ranging from 200° to 325° C. for periods of 1 minute to 120 hours; they were then treated with mercurous nitrate solution, which causes stressed brass to crack. Samples of cold-rolled strip of Brinell hardness, 90, 120, 165 and 200 were annealed together with the spun cups. The hardness of the strips was determined before and after annealing. Internal stress was removed from spun cups in 5 hours at 250° C., 1 hour at 275° C., 20 minutes at 300° C., or 5 minutes at 325°. Strip of initial hardness of 200 was appreciably softened by each of these treatments, but the hardnesses not exceeding 120 were not reduced at temperatures up to 300° C. Strip of initial hardness of 165 began to soften slightly in 2 hours at 275°C. or 20 minutes at 300° C. The hardness of fully annealed 70:30 brass is about 50 to 60 and a hardness exceeding 165 is rarely, if ever, required in cold-worked brass. The first effect of low-temperature annealing is a distinct, though small, increase in hardness.

THE ART OF CASTING IN HIGH TENSILE BRASS

Summary of Paper by Neil J. MacLean (Glasgow), presented at the Annual General Meeting of the Institute of Metals, held in London, on Friday, March 12, 1920.

"Manganese Bronze" castings as supplied by different makers having proved unreliable and unsatisfactory, a series of experiments was carried out with a view to obtaining castings made in sand molds (unchilled) having a guaranteed strength of not less than 20 tons per square inch, as shown by test bars produced under the same conditions as the castings themselves.

As a result of these experiments a copper zinc alloy was chosen containing 3 per cent. of nickel and 2 per cent. of iron, with a small quantity of manganese and phosphor tin. Special precautions were taken to accurately weigh the charge and to control the pouring temperature within narrow limits. A hardener of copper-nickel-iron was made up and finely granulated by blowing the molten metal into a tank of water. Special attention was paid to keeping the zinc content constant; ingots were analyzed after first melting and the zinc corrected when making up the final charge.

The alloy finally decided upon was made of scrap, new metal, and hardener, with the addition of zinc to correct for loss in previous melting. By this accurate weighing of the charge, control of pouring temperature, correction of zinc, and use of special hardener, castings were obtained having strength properties 50 per cent. better than gunmetal and at a cheaper price.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ACID DIP

Q.—We are sending you a sample casting of brass and we would like you to tell us how it has been cleaned. If it has been plated, how is it done? Or, if an acid dip, what acids are used and how are they mixed?

A.—The sample which you sent us was cast in sand, had the gate cut off, was tumbled, and then dipped into an acid-brightening solution.

This dip must be made up at the time of use.

A mixture of equal parts of sulphuric and nitric acids is generally used.

In some cases it is found that this is too strong a mixture, and a mixture of sulphuric acid 2 parts, nitric acid 1 part, muriatic acid ½ part, and water 5 parts is used. Sometimes salt is added to the solution, but in this case care must be taken to avoid the chlorine fumes which come off.

Other methods of obtaining a bright finish are sand blasting and dipping the casting into water while it is still at a low, red red heat. However, we do not believe that either of these methods has been applied to the sample in our hands. We know that it was tumbled by the numerous dents and little shallow furrows in the casting, and a deposit of green powder in the crevices indicate the use of an acid dip.—A. B. Problem 2,824.

BABBITTING WITHOUT TINNINC

Q.—We are at the present time experimenting with die cast connecting rod bearings similar to the bronze backed bearing manufactured by the Continental Motor Car Company. The information that I would like to get is whether there is a method of making the babbitt lining adhere firmly to the bronze shell without first tinning the shell. We thought that there might be some acid used which would eliminate the necessity of tinning.

A.—There is a practice at the present time, used by some of the bronze back bearing manufacturers, to babbitt the bronze shell without even tinning, by getting the shell hot and clean. No acid is used. They even go so far as not to machine any of the scale off the shell, but babbitt right on the surface by dipping in aqua fortis, then in sulphuric acid, then in cold water and then in hot water. If done properly and the babbitt not overheated a good job is done. However for a sure job you cannot beat the tinning.—W. J. R. Problem 2,825.

BATTERY SOLUTION

Q.—Please send me a correct solution for automobile storage battery, the metal which is used in the battery plates and how to melt for hard rubber.

A.—A 10% solution of pure sulphuric acid and distilled water is commonly used for storage batteries. The metal grids are made from die-casting metal. The thin wood insulators, as a rule, are made by the battery makers themselves.

As the making of storage batteries is out of our province, we would suggest that you secure a work that treats exclusively on storage batteries.

The filler is usually an asphaltum compound in storage batteries, and can be readily melted with a blue flame torch applied direct to the mixture.—C. H. P. Problem 2,826.

BLACK FINISH ON BRASS

Q.—Would you please give me one or two formulas for dipping brass to give it black finish or nearly so, and then to be lacquered. I have a dip of nitrate of silver and copper, but it wipes off.

A.—The ordinary ammonia copper carbonate black dip gives the simplest and most efficient method for bluish black deposit upon brass. The solution is prepared as follows:

Part 1.—Water. Two gallons, temperature 140° F.
Sodium carbonate crystals, 8 ozs.

Part 2.—Aqua ammonia, 26%, 1 quart.
Copper carbonate dry, 16 ozs.

Mix parts one and two separately. Then combine by mixing thoroughly. The solution is then ready for use.

The brass should be clean and bright. It is advisable either to brush down with pumice stone powder, and water for dead lustre, before immersion in the black dip or immerse in an acid mixture consisting of

Nitric acid 38°	1 gallon.
Sulphuric acid 66°	1 gallon.
Water	1 pint.
Muriatic acid	½ oz.

The immersion of the brass in the acid mixture gives a bright lustre to it. After blackening, the deposit should be protected with any ordinary lacquer.—Problem 2,827.

BLACKENING ZINC

Q.—We are making a great many etched zinc plates and wish to know the best method of staining or blackening the background. We wish to produce a black ground and a black that will stand benzine in cleaning the plates.

A.—A hot concentrated solution of sodium cyanide and arsenic will produce a gray black tone on zinc. The formula is as follows:

Water	1 gallon
Sodium Cyanide	8 ozs.
White Arsenic	3 to 4 ozs.
Caustic Soda	½ to 1 oz.

Temperature 180 deg. Fahr.

You can also find data on this subject in "Metal Coloring" by Hiorns, under the heading Coloring of Zinc.—C. H. P. Problem 2,828.

BRASSING AND COPPERING

Q.—Can you furnish us what is known as a wash for copper plating and brass plating such as used by all the tack factories through the country, as you understand, they do not use any electricity at all, simply use the chemicals and a wash. After the tacks have been plated, they are put into a barrel which contains sawdust that dries them.

A.—A number of years ago the immersion or "wash" method of coppering and brassing tacks was used almost exclusively. During the past few years the method has been replaced by the electroplating. All tack firms in Cleveland now use the electro method.

The following solutions are used for the immersion or wash method:

Copper

Water	1 gallon
Copper Sulphate	2 ozs.
Sulphuric Acid 66%	1 oz.

Brass

Water	1 gallon
Copper Sulphate	2 ozs.
Tin Chloride	1 oz.
Sulphuric Acid	1 oz.

The tacks should be immersed in their respective solutions in iron wire baskets. The tacks must have been previously tumbled clean and bright.

They should be immersed dry after coppering or brassing. Wash in cold and hot waters, drain the excess of water from the tacks and tumble in hot maple wood sawdust.

The respective solutions must be kept up to strength by additions of materials given in the formulas.

If the brass is too white add small proportions of copper sulphate to the solution, if too red then small proportions of tin chloride. The brass dip is frequently quite erratic.—C. H. P. Problem 2,829.

CEMENT-COATED NAILS

Q.—We are desirous of obtaining a formula for cement-coated nails, and have been referred to you by Impervious Metal Corporation.

A.—You can obtain a copy of the patent covering the process of making cement-coated nails by writing to the Patent Office, Washington, D. C. It was granted to Ira Copeland of Brockton, Mass., in May, 1887. The compound used was mainly resin and it was put on with the aid of a hot tumbling barrel. Attempts have been made to use paints and varnishes, but the resin has proved most satisfactory and gives the nails the greatest holding power.—J. L. J. Problem 2,830.

COLORING COPPER PLATED WIRE

Q.—Please let us know how we can obtain the following colors on copper bessemer wire: pink, white, orange, yellow, azure blue, lavender?

A.—You will be unable to obtain the colors you mention upon copper colored bessemer steel wire by any method of oxidation or plating. The most satisfactory method would be one of lacquering the wire and then dyeing the lacquer to produce a uniform color of any tone desired. The manipulations would be as follows, and should be carried out along mechanical lines so that the wire could be lacquered, dried, dyed, washed, dried and recoiled upon spools or otherwise.

1. Lacquering of the wire by passing through a suitable lacquer, vibrating the wire to remove excess of lacquer and passing through an iron pipe externally heated with bunsen flames to dry the lacquer.
2. After lacquering passing through the dye which may consist of any colored dye soluble in denatured alcohol or fusel oil. Wood alcohol cannot be used as it dissolves the lacquer.
3. After passing through the dye the wire is passed through clean, cold water, then vibrated to remove the excess of water and then dried as outlined following the lacquering.

The white tone would have to be produced by a white enamel or silvered by plating or dipping. On the latter subject Hiorns' metal coloring will prive of interest.

It would be advisable to get in touch with lacquer firms. They may be able to give additional data and the most suitable lacquers and dyes to use for your purpose. The first three firms are in New York City, the last one in Brooklyn.—C. H. P. Problem 2,831.

DIE CAST BEARINGS

Q.—Have you a book or books that would give me some information on die casting metal bearings either by pouring from ladle or with machinery under pressure? Also on dies and machinery used for this purpose.

A.—There are no books published on die-casting. We know, however, from experience that metal bearings, that is white metal bearing, can be cast into steel molds. The writer has seen connecting rods babbitted almost automatically. No pressure was applied as the weight of the pot of melted metal was sufficient. A die was placed inside the connecting rod, and the metal allowed to flow in around it, through four ports. As soon as the space was filled the metal was shut off by means of a gate, the rod removed and the die extracted. The bearing had to be trimmed, trued up and polished afterwards.—A. B. Problem 2,832.

LEAD COATING

Q.—We have under consideration the manufacture of a steel article used on electric batteries and which calls for a lead finish.

This material is put on hot, and we would be pleased to know just what we could use for a flux in order to make the lead stick. We are doing large quantities of hot galvanizing, but the same acid dip does not seem to stick.

A.—In coating steel with lead by the molten method, the usual fluxes used in tinning or galvanizing do not apparently produce results, and without a flux the lead is non-adherent. A flux that overcomes the difficulty is one prepared from ammonium chloride and bi-chloride of mercury. The proportions are approximately as follows:

Water	1 gallon
Granular sal ammoniac, 98.99%	8 ounces
Bi-chloride mercury	2 ounces

These proportions may be varied; for, in other words, experiments to decide what mixture gives the best results should be made.

In lead coating half of one per cent antimony is permissible, so the formula should be lead 99.55, antimony .55. Such an alloy coats better and is just as satisfactory in resisting the corrosion from sulphuric acid on storage battery parts as pure lead.

To prevent the lead drossing, it is advisable to pole the molten lead to bring up impurities. The poling method is accomplished by using a green wood, preferably hickory. The pole should be about three or four inches in diameter and about four or five feet long. The steam generated from the wood in the molten metal forces the impurities to the surface of the lead, which should be removed.

In cooling the lead coated steel parts to produce a smooth finish, paraffine, cocoanut oil or beef tallow should be used. Plain hot water seems to cause the lead to congeal in small lumps, which produce roughness.—C. H. P. Problem 2,833.

METAL FOR EXPANDED COUPLINGS

Q.—We are at present making up a quantity of couplings, which have to be expanded and are having considerable trouble expanding these, as the tendency of the metal is to crack.

We have tried the two following alloys: 84 copper, 8 spelter, and 8 lead, also 84 copper, 4 spelter, and 12 lead, but in both cases the result is identically the same.

The expansion required in a 1½ inch hole is about ⅛ of an inch.

Any information you can give us regarding a good, cheap mixture to stand the required expansion, will be greatly appreciated.

A.—The absence of tin and the large amount of lead in your mixtures is the cause of the cracking of your castings. The presence of lead facilitates machining, but it reduces ductility very considerably when used in the amounts you mention. The presence of a small amount of tin is desirable as a better alloying of the lead results. The tin gives fluidity and a better casting alloy also.

It is suggested that the following alloy be tried: 84 copper, 10 zinc, 3 lead, 3 tin. This alloy has great toughness and ductility and should withstand the expansion you require without cracking.—J. L. J. Problem 2,834.

PLATING COSTS

Q.—We would greatly appreciate any assistance you can give us on the subject of plating, polishing, buffing and coloring and lacquering costs.

What we would like is the relation of the material cost (of the plating, polishing, etc., supplies) to the labor cost of each operation—showing nickel and copper plating separately.

What we have tried to do is to establish basic costs so as to take care of thin castings (under 1" thick) and sheet metal parts (from .014" to .090"), keeping in mind the area or surface finished.

A.—The cost problem covering polishing, plating and lacquering is a difficult one, as "labor" is the prime factor in each instance. It has been decided by many firms that if the labor cost is doubled it will cover the cost of materials and incidentals, but many firms add an additional 25 per cent for deterioration of equipment. We are of the opinion, however, that the problem can only be worked out as an individual proposition.

The equipment is a fixed charge plus the deterioration. The amount of supplies entering a department, and their cost, say, per month, should be kept in detail. The output in pounds of plated or lacquered material, or the number of pieces finished during a month, the labor cost of the month's production, etc. When those items have been tabulated, say, on a run of two or three months, then it can be readily determined whether doubling the labor cost of a month's production will take care of the cost of materials and incidentals expended in finishing. The percentage to be added to the cost of labor can then be made accordingly.—C. H. P. Problem 2,835.

PATENTS

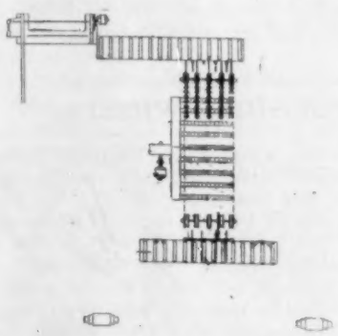
A REVIEW OF CURRENT PATENTS OF INTEREST

1,326,775. December 30, 1919. **Process for Increasing the Hardness and Tenacity of Metals and the Ease of Their Working With Cutting-Tools.** Gabriel Van Oordt, of Basel, Switzerland, assignor to the Société Anonyme des Usines Giulini, of Basel, Switzerland.

The principle underlying the present invention differs from that underlying the known processes for increasing the hardness and tenacity of metals and the ease of their working with cutting tools that by the invention metals and alloys, particularly aluminum and aluminum alloys, are heated, not to high temperatures, but to relatively low temperatures which are below the characteristic annealing temperatures of the metal in question, that is to say, the temperatures used for the annealing by heat treatment. The temperature to be used at which a hardness and a tenacity as great as possible are obtained in the shortest time is another for each metal or alloy, but an entirely determined one. This temperature may be called the characteristic heat-hardening temperature and is ascertained experimentally.

1,330,099. February 10, 1920. **Apparatus for Handling Metal Plates and Sheets.** William J. Stoop, of Wheeling, W. Va.

This invention relates broadly to an apparatus for handling metal plates and sheets, and more particularly to improved means for effecting the transfer of plates and sheets from the finishing rolls of a rolling mill to the shears.



The primary object of the invention is to provide a conveyor to which the heated plates and sheets which emerge from the finishing rolls of a mill or mills may be delivered and by which such plates or sheets will be transferred to a point in proximity to the shears with their surfaces free from scratches and other injuries to which they are subjected when handled in the heretofore prevailing manner.

1,327,620. January 13, 1920. **Soldering Composition.** Fred E. Lampe, of Newark, N. J.

This invention relates to a new and useful composition of matter for use in soldering, and its object is to provide a paste-like material which is easily fused and which contains both solder and a flux therefor, and inflammable material. Another object is to improve upon such combined solder and flux compositions as have been known heretofore. A still further object is to provide a material which will not deteriorate and which is in a handy form and always ready for immediate use.

The preferred proportions are:

Powdered Solder	40 lbs.
Resin	½ lb.
Salammoniac	4 lbs.
Light Petroleum	4½ lbs.
Dark Petroleum	2½ lbs.
Ceresin Wax	¾ lb.

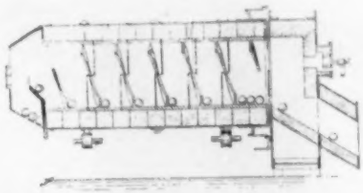
1,328,282. January 20, 1920. **Composition for Coating New Iron and Steel.** Albert C. Holzapfel and Paul Walther, of New York, N. Y.

This invention relates to a composition of matter adapted for coating new iron and steel, and which may be subsequently covered with a paint of a lighter color, while not necessarily restricted to this use.

In accordance with this invention, a composition of matter is provided possessing all of the advantages of the ordinary bituminous solution, but being free from their objections. This improved composition of matter comprises the following ingredients, preferably combined in the proportion indicated:

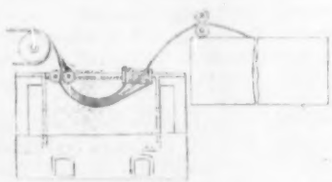
12 parts by weight of stearine pitch.
20 parts by weight of asphaltum, and
68 parts by weight of tar oil.

1,330,219. February 10, 1920. **Sectional Lining for Rotary-Furnaces.** Walter S. Rockwell, of New York, N. Y., assignor to W. S. Rockwell Company, of New York, N. Y., a corporation of New Jersey.



The present invention relates to an improved means of providing a cylindrical rotary furnace with an interior spiral rib, to produce a spiral channel for automatically conveying the material to be heated from one end of the furnace to the other when the furnace is rotated.

1,330,399. February 10, 1920. **Method of Plating Metal Articles.** Robert J. Shoemaker, of Milwaukee, Wisconsin.

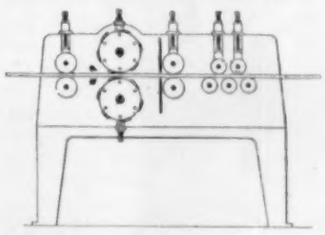


This invention relates to the art of plating metal articles, and has for a principal object to provide an improved method, whereby this operation can be performed more expeditiously, economically and effectively than has been possible before.

A further object is to provide a flux of novel composition for use in operations of this character.

1,328,034. January 13, 1920. **Means for Scalping or Overhauling Metal.** James Robert Coe, of Waterbury, Conn., assignor to the American Brass Company, of Waterbury, Conn., a corporation of Connecticut.

This invention relates to means for scalping or overhauling sheets or plates of brass or similar material, and has for its object to provide for accomplishing this result in a more thorough and efficient manner, with less cutting of the metal than heretofore and with less power. It also has for its object to provide a means in which loss and damage due to breakage is reduced, and in which broken parts can be easily and economically replaced. It also has for its object to provide a machine in which a plate can be both straightened and overhauled in one operation.



1,327,315. January 6, 1920. **Apparatus for Manipulation of Metal Ingots and the Like.** Evan Walter Davies, of Dowlais, Wales.

The present invention, while embodying the characteristic features of my aforesaid principal invention relates to a simplified construction of apparatus designed for use where it is not required to deal with ingots or the like of so many different sections, or to turn them through so large a range of angles as was the case with the apparatus particularly described and shown in the former specification.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

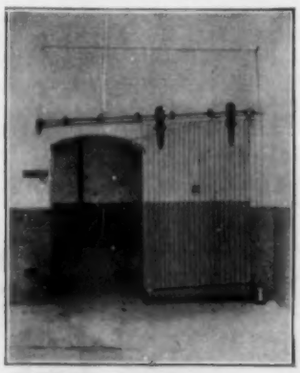
FIREPROOF DOORS AND SHUTTERS

Equipping plants with the latest approved fire protective devices such as fire alarm systems, sprinklers, etc. and neglecting durable and efficient approved fire doors and shutters for all openings where fire is likely to spread from one room to another, or from building to building, is similar to the man who secured the windows of his home and thought he was playing safe by leaving the doors open. The result is obvious.

HINGED DOORS AND SHUTTERS.

When fire comes, it may spread with fury and great rapidity. Unprotected, or poorly protected doorways and windows offer flames every possible chance to travel and destroy all that lies in their path. The accumulation of thought and labor of many years can be destroyed in a few hours.

Evans "Almetl" Fire Doors and Shutters are built with the object of preventing or controlling fires by acting as bulkheads. They are made of two sheets of corrugated Galvanized Steel (interlined with Asbestos) bound in a rigid continuous welded frame of heavy corrugated steel, which is reinforced on all edges with an extra heavy Galvanized Steel Binder.



SLIDING DOOR.

The constructural features embodied in these fire doors and shutters is said to furnish great resistance to heat, ensure light weight for easy operation and great durability, as far as permanence can be attained by human effort.

Approvals have been accorded by the Underwriters' Laboratories of Chicago, Factory Mutual Laboratories of Boston, and the Cook County (Ill.) Board of Underwriters.

GALVANIZING REINFORCING BARS

The Thomas Gregory Galvanizing Works, 263 North Henry street, Brooklyn, N. Y., have distributed an unusually interesting pamphlet, which includes an article on The Cracking of Reinforced Concrete and Its Cure.* The purpose of this article (the conclusions of which are given below) is that an important cause of the cracking is the disintegrations and expansion of the reinforcement due to rusting. To eliminate this, hot galvanizing is recommended.

The following conclusions are drawn by the writer from his investigations of the action of salt, brine, and sea-water on reinforced concrete.

1. All concrete which is not waterproofed in some way is more or less porous to water.
2. Brine readily softens the surface of concrete, and, therefore, more easily penetrates to the reinforcements, on which it exerts a disintegrating action that, owing to the attendant expansion, gradually weakens the concrete, causing it to crack and split, and in some cases to fall away from the reinforcements.
3. Reinforced concrete floors which come in contact with brine will gradually develop leaks. This will be followed by incrustations of discolored salt on the under side, where, later, iron-stained hair cracks will develop, running parallel to the reinforcements. As the deterioration progresses the cracks will widen, and, owing to the great expansive force of the accumulating iron oxide, the concrete will be gradually pushed from the corroded reinforcements and ultimately fall.

In view of the foregoing conclusions the Thomas Gregory Galvanizing Works states that it is evident that reinforced concrete, which will show some cracks in ordinary atmospheric conditions, and very decided cracks in connection with brine or sea-water, should be reinforced with bars or lath that are absolutely rust-proof, and the best way to obtain absolute rust-proof steel is by hot galvanizing.

*First published in Chemical and Metallurgical Engineering, Oct. 15, 1918.

SHEEPSKIN POLISHING WHEELS

"Absolutely no waste" is the boast of the Yorkville Manufacturing Company, Inc., which can be heard on a visit through their recently enlarged plant now located at 31-33-35 Broadway, Brooklyn, N. Y., where they occupy a loft of nearly 10,000 square feet.

They are specialists in leather products, their main line consisting of sheepskin polishing wheels, which they have been making for the past nine years. Besides sheepskin wheels, they turn out numerous other leather products.

They are consumers of both russet and white alum sheepskin. Of course, the greatest and best parts of these skins are consumed for the production of sheepskin wheels. The question that arose a long time ago was, "To what use could the remainder of the skins be put," and this was answered by the manufacturers of shoes, who suggested "shoe trimmings." By this method the flanks and the stretchy parts are utilized to great advantage. Such parts of the shoe as top stays, side stays, blutcher stays, corset linings, quarter linings, tips, sock linings, etc., etc., are made.

And when all of these articles are cut, there is still a very large quantity of waste, too small to be utilized to any great advantage. This is passed on to their "extension," where they have installed an Abbe Grinding Outfit. This equipment grinds their waste into leather meal and shredded leather, which is used in connection with polishing and burnishing in tumbling barrels.

A NEW FLUX

Raylax is a chemical compound of chlorides and fluorides for the purpose of absorbing the oxides and dross that form in molten metal, and it is claimed that Raylax gives off no noticeable fumes. Raylax also cleans the metal, as the dross floats free on top and can be skimmed off with little or no metal in it. For cleaning a 50-pound ladle or crucible of aluminum just before pouring, two or three ounces of Raylax are thrown into the ladle and stirred into the molten metal and the oxides and dross come up in a light froth that can be skimmed off clean.

It is stated that Raylax can be used to reduce aluminum or brass chips with wonderfully good results by mixing 5 to 10 per cent Raylax with the chips before charging the crucible. The

crucible should have about one-quarter broken or melted metal to facilitate reducing the chips, and as the chips melt down the mash should be puddled occasionally with an iron rod and more chips added. The dross should float freely on top of the clean metal and can be skimmed off very easily with but little loss in weight.

The Brightwood Bronze Foundry Company, Springfield, Mass., have used Raylax extensively and are very much pleased with the results. They state that the castings cleaned with Raylax show a high tensile strength and greater elongation than when cleaned by other methods. Castings from scrap and chips reclaimed by Raylax showed a tensile stength of 18,800 pounds. It is manufactured by the Mirete Company of Massachusetts, Inc., Springfield, Mass.

FIGHTING FIRE WITH FIRE

The literature of the pioneer days in the prairie states is replete with stories of emigrants who, finding themselves in the path of a prairie fire, resorted to the expedient of lighting another fire, which cleared a refuge for them before the oncoming rush of flames could harm them.

Modern fire-fighters today combat flame with flame, but in another way. Oxy-acetylene apparatus is used for cutting away metal obstructions that may be interposed between the firemen and expeditious performance of their work. It may be a grating or an iron door that must be wrecked at a moment's notice to admit the passage of the hose and men, or to afford an entrance for rescuers. Sometimes it is the metal hull or hatch of a ship that must be penetrated in order to fight a fire in the hold. Whatever the obstacle it must be removed with the least possible delay.

Axe, crowbar and sledge are of little avail against steel and iron. Work that would require hours with these implements must be done in minutes. And it is done. Some fire departments now use the oxy-acetylene torch, the only device that has been found adequate to the emergency. By use of the cutting blowpipe no metal barrier can stand long in the way of the modern fire-fighter. His outfit is easily portable so that he can work with it at the critical point at the moment it is needed. There is no delay. It is already set up ready to use when it is brought to the work. One type of outfit consists of an Oxweld metal cutting blowpipe, a cylinder of Linde oxygen and a Prest-O-Lite tank of dissolved acetylene.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

Secretary Hoyt makes the following announcement, to supplement previous information and answer questions that have been raised:

There are two lecture halls in Building No. 1 that will be used for meetings morning and afternoon throughout the week, and in addition to Registration and Information Headquarters, there is considerable exhibit space. It is proposed to do something out of the ordinary in this building in the way of booth construction and decorations.

Building No. 2 was planned for exhibitors who require a small amount of space and who will not need power other than that which can be obtained from the lighting circuits. The booths in the four center blocks will be constructed with solid paneled back walls six feet high. As this is the only building in which provision is made for small booths we would suggest that where requirements are in excess of 300 square feet selections be made in one of the other buildings.

In the Coliseum it is proposed to cover the aisles with sawdust or tan-bark and where exhibitors desire it we will build board platforms in the space that will be used for office purposes.

As a result of the responses to our earlier bulletins from approximately 150 exhibitors, giving information as to space requirements and plans, it was possible to furnish detailed layout just two months earlier than we did last year. If you will be prompt in sending in your formal applications with information, assignments of space can be made correspondingly earlier than in previous years.

BIRMINGHAM METALLURGICAL SOCIETY

The Birmingham Metallurgical Society, which claims to be the oldest society dealing with the non-ferrous, as well as the ferrous metals, and which now has about 800 members, has just completed its Scholarship Scheme. The scholarship is to provide a university training for youths who are engaged during the daytime in metallurgical work (interpreted in a wide sense) and who are endeavoring to create a career for themselves by study at evening classes, but whose circumstances do not admit of their proceeding to the university without financial help. It will be awarded to the candidate, not over 20 years of age, who in the July Matriculation Examination of the Joint Matriculation Board of the Northern Universities has obtained the highest number of marks in Chemistry, Pure Mathematics and Mechanics. In addition candidates must talk either French or German. The scholarship will be of an annual value of £100, inclusive of fees and will be renewable for three years. It will be held at the University of Birmingham and the scholar will be required to take the examinations for the degree of B.Sc. in Metallurgy.

The Council of the Society have elected as officers for the ensuing year: President, A. Spittle, M.Inst.M.; senior vice-presidents, F. Johnson, M.Sc. (head of the Metallurgical Department, Birmingham Municipal Technical School); Dr. H. W. Brownsdon (Kings Norton Metal Company); A. J. G. Smout, A.I.M.M. (Elliott's Metal Company), and H. B. Jacks.

EXPOSITION OF CHEMICAL INDUSTRIES

The 1920 annual, which is the Sixth National Exposition of Chemical Industries, returns to the Grand Central Palace in New York, where it will be given during the week September 20 to 25, inclusive. The Exposition will be more pretentious than ever; in fact, it will be the largest distinctly industrial exposition ever held, and will surpass its own predecessors by one-third.

This year the exposition will have three special sections, one, the Electric Furnace Section, another the Fuel Economy Section, and the third a Materials Handling Section, the two latter are new sections; the first will, as its name implies, be one of electric furnace exhibits; the Fuel Economy Section will consist of exhibits of machinery and apparatus, furnaces, producers, stokers and all devices for the economic utilization or more efficient combustion of fuel. The possible exhaustion of our fuel reserves in the not far distant future and the present high cost of fuel makes this section one of much interest to all industrial plants. The Materials Handling Section will be a series of exhibits of machinery and equipment for the handling of material such as: conveying, transporting, elevating; included in this will be weighing, measuring and power transmission equipment. So important have these mechanical features become for all industrial plants due to the shortage and high-wage for man-power that an unusual interest is expected in this new section.

BRIDGEPORT BRANCH A. E. S

At the May 21, 1920, meeting the following officers were elected for the coming year: President, J. M. Dunn; vice-president, John M. Slattery; secretary-treasurer, Louis J. Maraffi; sergeant-at-arms, John Rall. Board of Managers: W. G. Stratton, William Flaherty, Philip Willet. Laboratory Committee: J. M. Dunn, Harry Johnquest, William Thompson, W. Y. Stratton, E. A. Maraffi.

The seventh annual banquet of the American Electro-Platers' Society was held at the Stratfield Hotel, Saturday, May 29, and the attendance was larger than usual.

An interesting illustrated lecture was delivered by Dr. W. Blum, of the U. S. Bureau of Standards, Washington, D. C. Miss Zalia Jencks, formerly attached to the Bureau of Standards and now connected with Yale University, delivered an excellent paper on the art of electro-plating.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

Royal F. Clark, ex-secretary of the Bridgeport Branch of the American Electro-Platers' Society, has moved from South Norwalk, Conn., to 6 West End avenue, Trenton, N. J.

Joseph H. Beek, traffic director of the St. Louis Association, has been appointed executive secretary of the National Industrial Traffic League, vice Guy M. Freer, deceased.

Francis Juraschek, an engineering man of technical and general advertising experience, is now heading the technical department of Hanff-Metzger, Inc., general advertising agents, New York.

Henry Schoch, Sales Engineer of the General Briquetting Company, has been elected vice-president of the Nukol Fuel Company of Ontario, Canada, and took up his work for that company with headquarters in Toronto, on May 17.

Frank J. Brown, formerly with Berry Brothers, has become associated with Hilo Varnish Corporation, Brooklyn, N. Y. Mr. Brown will make his headquarters at Pittsburgh and will look after a special class of trade in the industrial field.

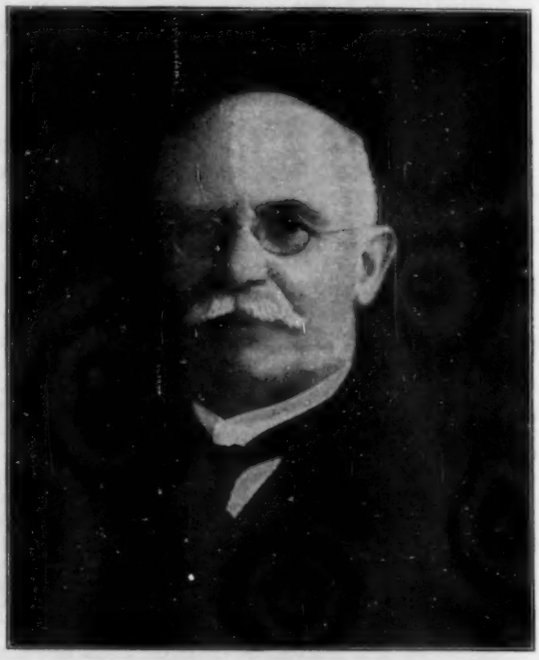
Henry Berliner, who is known in the non-ferrous metals trade, has accepted a position with the Sandusky Foundry and Machine Company, Sandusky, Ohio, developing business in new lines for their fluid compressed bronze casting and the purchase of non-ferrous metals.

Colonel Washington A. Roebling, vice-president of the John A. Roebling's Sons Company, on May 26 celebrated his 83rd birthday by entertaining a number of relatives and friends at his mansion on West State street. Despite his age, the colonel is well and active and makes daily trips to the Roebling offices to attend to business. Colonel Roebling was born at Saxonburg, Pa., May 26, 1837. He was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., when but 20 years old, and immediately became associated in business with his father, the late John A. Roebling.

GEORGE E. LONG

Business men, newspaper men and others will hear with mingled feelings of regret and rejoicing of the retirement from active duties of George E. Long, vice-president of the Joseph Dixon Crucible Company, Jersey City, N. J. Mr. Long will be remembered as one who always lent a courteous ear to callers, taking the pains to determine the nature of the business and then directing the caller to the right department, or attending to him himself, if the caller had anything worth selling. The trade journal fraternity, especially, will miss his genial personality, but will rejoice to know that he has reached the retirement age, and can now take a long rest.

Mr. Long has recently celebrated his seventieth birthday, and had been with the Dixon Company for forty-three years, beginning in the capacity of stenographer and advancing respectively to the offices of secretary, treasurer and vice-president. He had contributed a number of ideas to the Dixon Company, which worked out very successfully. He retains his interest in the company by remaining on the board of directors.



GEORGE E. LONG.

DEATHS

FREDERICK A. BENNETT

Frederick A. Bennett, of the manufacturing firm of Bennett & Seeley, and for 12 years secretary of the Manufacturers' Association, died at the Bridgeport Hospital following an operation for appendicitis. He was 33 years old and leaves a wife, who was Miss Maud Blackman of Newtown.

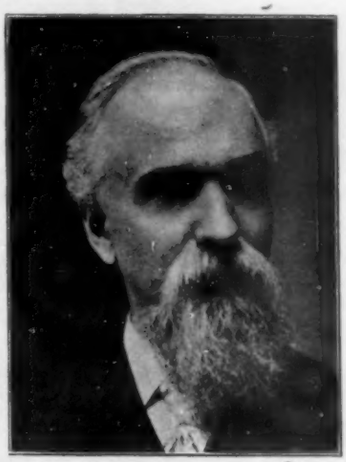
FREDERICK A. BENNETT.

Mr. Bennett was born in Boston. He came to Bridgeport in 1908 to accept a position with the Manufacturers' Association. About two years ago he entered into partnership with Eldridge Seeley as foundry equipment manufacturers at 823 Railroad avenue, but remained with the Manufacturers' Association until very recently when he was to take active control of the manufacturing concern. A few days after his resignation from the association he was taken ill, and was hurried to the Bridgeport Hospital for an operation for appendicitis. The operation was apparently successful, but a sudden sinking spell resulted in his death.

MARSHALL DARLING

After 21 years' service with the Scovill Manufacturing Company, Marshall Darling died at his home in Waterbury, 15 Crossett street, on February 6. Mr. Darling was a tool maker by trade, and at the time of his death was in charge of the tool stock of the Scovill company. Throughout his long term of service with the Scovill company, Mr. Darling was a trusted employee and was faithful to the many duties which were in-

trusted to him. He was a member of the Noshahogan Lodge, I. O. O. F. and Anchor Lodge N. E. O. P.



MARSHALL DARLING.

EDWIN H. NEARING

Edwin H. Nearing, foreman in the rolling mills of the Scovill Manufacturing Company, died January 18, after a short illness. Mr. Nearing came to the Scovill company in March, 1897.

EDWIN H. NEARING.

ARTHUR H. HIORNS

Arthur H. Hiorns, who died on April 17, was known throughout the world by his text books on metallurgical subjects, which were translated in many languages. For more than forty years he took the lead in the teaching of metallurgy in Birmingham. He commenced this work at the Birmingham & Midland Institute which at that time was the great institution for the promotion of technical and literary study. About thirty years ago the voluntary work of the institute in technical education was superseded by the establishment of the Municipal Technical School and for the headship of the metallurgical department of the school, Mr. Hiorns was naturally designated. He held that position until the middle of 1912 when he was succeeded by F. Johnson, M.Sc. Many thousands of students all over the world owe their introduction to metallurgy to the books which Mr. Hiorns brought out, some of which are still regarded as standard text books. That on "The Coloring of Metals," a pet subject with the author, and one in which he initiated some important advances, is still the only comprehensive work on the subject, while his books on "Mixed Metals" was for many years the only work in the field. Other well-known publications of his are "Metallography" and "The Metallurgy of Iron and Steel." Since 1912 Mr. Hiorns had lived in retirement in the country a few miles from Birmingham, but he occasionally attended meetings of the societies with which he had been connected. The last occasion being a meeting of the Birmingham Metallurgical Society in 1917. At the time of his death he had reached the age of 73. It was by him that the Birmingham Metallurgical Society, which claims to be the oldest society of its kind and now has over 800 members, was founded. It was carried on for many years in association with the Technical School and Mr. Hiorns was for a time its president. He was much beloved by his students and as the result of the training and encouragement received from him many of them are occupying leading positions as metallurgists in various parts of the world.

JOSIAH ANSTICE

After an illness of several months, Josiah Anstice, president of Josiah Anstice & Co., Inc., a prominent manufacturer and banker of Rochester, died on Wednesday, May 26, at his home, 265 Culver road. He was 66 years old.

Mr. Anstice was born in Yonkers on July 27, 1853. He was a son of Henry and Mary Saltonstall Anstice. He was graduated from New York University and came to Rochester soon after, entering the banking house of Daniel W. Powers, later becoming associated with the E. E. Sill Stove Company. He afterwards formed his own company for the manufacture of hardware specialties, in which he was active until the time of his death. In 1883 he married Mary Reynolds, a daughter of Mortimer F. Reynolds.

Mr. Anstice was for many years a director and later a vice-president of both Rochester Savings Bank and the Rochester Safe Deposit Company. He was active in the foundation of the Reynolds Library and has been its treasurer since its inception. He was also one of the founders of the Rochester Country Club and a member of the Genesee Valley Club. He was an active member of St. Luke's Episcopal Church, of which for many years he had served as a vestryman and warden.

Besides his wife, Mr. Anstice leaves a son, Mortimer R. Anstice; two daughters, Mrs. J. Francis Weller and Mrs. Lawrence Gardner; six grandchildren, and a brother, Rev. Henry Anstice, D.D., of Montclair, N. J., for many years rector of St. Luke's Church in Rochester.

ALFRED KIRBY HUNTINGTON

Professor Alfred Kirby Huntington, A. R. S. M., who died on April 23, was Professor of Metallurgy at King's College, London. Professor Huntington was trained at the Royal School of Mines, South Kensington, and in France. He was first attracted by chemical research, and in 1880 joined Sir Charles Siemens in the study of the possibilities of electric furnaces. Their crucible arc furnace was described long before the electric furnace attracted wider attention. Several papers were subsequently given by Mr. Huntington on the fusion of metals (including refractory tungsten) in plumbago crucibles. Professor Huntington was one of the old members of the Iron & Steel Institute, and had a large share in the establishment of the Institute of Mining and Metallurgy, whose president he became in later years. He was one of the earliest members of the Institute of Metals and was president in 1913 and 1914. He presided at the Ghent meeting in 1913. During the last few years he had been actively identified with the work of the Faraday Society.

FREDERICK RUECKERT

Frederick Rueckert, vice-president of the White Metal Company, died in St. Mary's Hospital, Hoboken, eight hours after a masked man had shot him in his home. The Hoboken police decided after checking and rechecking of the circumstances of his death that he had been the victim of a burglar.

GUY M. FREER

Guy M. Freer, secretary of the National Industrial Traffic League, died at his home in Chicago after an illness of but twenty-four hours. He was buried at Spring Grove Cemetery, Cincinnati. Officers and members of the National Industrial Traffic League served as pallbearers.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

JUNE 1, 1920.

Waterbury is facing a serious strike situation. Unskilled laborers, out for seven weeks, have been strengthened by a walk-out of machinists. Both appear to be set to fight to the end for the satisfaction of their demands. Estimates of the total number out have varied greatly. Strike leaders claim a total of 15,000, 3,000 of whom are machinists. Manufacturers, however, declare that the number is far less than that. It is impossible to obtain an accurate estimate of those out, as the number changes daily, and various sources of information send conflicting reports. Practically every plant in the city is affected.

The bitterness of the strike was increased by the arrest of 135 of the strikers in front of the plant of the Waterbury Clock Company, one of the Chase plants, last Tuesday afternoon. The charge on which they were arrested was parading without a permit, and breach of the peace. The police claim that the strikers were parading about the Chase plant in large numbers, crying "Scab" to their fellow-workers still at work, and otherwise intimidating them with placards.

The strikers, on the other hand, say that the arrests were entirely without justice, that they were not parading, and that they were not intimidating other workers, unless the 4 by 4 placards which they have been wearing in their hats since the beginning of the strike may be called a form of intimidation. The strikers made no resistance to the arrest.

The lot were tried in the city court here, and were fined a small amount and costs. They gave immediate notice of appeal and will fight the case.

The State Federation of Labor meeting here voiced their protests at the action of the police in resolutions sent to the mayor and police chief. They have pledged their support to the strike and have called on all other branches of the American Federation of Labor to support the organized labor in its strike here.

The demands of the machinists are a general increase of 35 per cent. in wages, a 44-hour week, with the unskilled laborers asking 75 cents an hour and an eight-hour day. The chief bone of contention, however, as in nearly all labor troubles here, is the recognition of the union and the forcing of the eight-hour day Waterbury is one of the few large manufacturing cities in the country where the eight-hour day is not in force, say strikers. The manufacturers are opposed to unions, and refuse to deal with representatives of the labor unions here, insisting on negotiation with shop committees.

Two government representatives, Commissioner Thomas J. Williams, commissioner of conciliation of the United States Department of Labor, and H. G. Skeffington, commissioner of immigration for the Boston district, have been in Waterbury for some time in an effort to bring about a reconciliation between the opposing factions. Their efforts have been hindered by the fact that the strikers are organized in three unions. The unskilled laborers in a local organization, the Waterbury Workers' Association and a branch of the A. F. L., and the machinists in the local chapter of the A. F. L.

The sentiments of the manufacturers as a whole are expressed in statements by John H. Goss, of the Scovill Manufacturing Company.

"This is no time to make demands—no time to consider demands," he said. "Conditions in this country today and by and large in this community are so abnormal that nobody is able to frame demands which are based on a right and proper consideration of the conditions and certainly nobody is able to consider or discuss them for the same reason. When this storm is over, things will get down to a normal condition. I speak not only of the state of men's minds, because the men's minds are not any more upset than mine is today, but I also speak of the general conditions in the railroad situation and everywhere, which are all so abnormal. Any decision made today might be upset tomorrow, no matter what judgment was put on it. When the storm is over, and any of our employees as our employees have anything in their minds that they are not satisfied with, they can come in and we will talk it over on its merits, just as we always have done."

In this speech Mr. Goss referred to the bone of contention—that of union recognition. Throughout he and other manufacturers have refused to have anything to do with union representatives, insisting on dealing with shop committees.

The strike has come at a peculiar time; it may be a time injurious to the strikers' cause. The freight situation, here as in other parts of the country, has halted to a large extent the import of raw material and coal. As supplies have diminished, the manufacturers have found themselves in an easy position to withstand the possible shutdown which continued opposition to demands may bring about.

When the machinists' strike was threatened, manufacturers claimed that they would close down completely if the walk-out occurred. As yet, however, no factories have closed down. The Blake & Johnson Company, one of the hardest hit by the machinists' strike, announced their intention of closing temporarily, but reconsidered their determination.

Some suffering has been felt among the unskilled laborers who have been out for seven weeks. Appeals to charity organizations have been refused, although money and food has been sent in by friends of the strikers. Many have sought work outside of Waterbury.

The State Federation of Labor has been meeting here all this week. They have given their unqualified support to the local strike.

The Manufacturers' Association of Connecticut has strongly protested against the proposed freight restriction by the railroads. It also urged that no unnecessary demands be made on the resources or facilities of the state by any concern or individual. They claim that the proposed order would close down a large number of industries, the stoppage of the earnings of thousands of workers, that the movement of coal is not of vital necessity at this time, that conditions at the New Haven gateway are improving and that government interference at this time is not advisable. E. Kent Hubbard, president of the association, made the following comment:

"It must be clear to the most casual observer that the most vital issues of our economic and social welfare are at stake in the present condition of railroad transportation in the United States. Obviously, under such conditions no one can guarantee Connecticut manufacturers will continue to be in a position to afford regular, uninterrupted employment to all industrial workers now engaged. We are assured by most competent authorities that even were the railroad yards fully manned tomorrow, the roads could hardly be restored to normal operations in less than 60 days. It seems to me, therefore, that not only is this situation of vital concern to the public generally, but to each individual, and that anyone who now makes any unnecessary demand upon our economic resources and facilities, or who contributes anything less than his own best efforts, is acting against the interest of both himself and the public.

All metal trades in Waterbury will soon be organized into one labor unit, which may comprise 10,000 men. Preliminary steps for the formation of a Metal Trades Council in this city were taken at a convention of the metal trades of the states held here recently. The meeting was attended by 46 delegates and representatives of international unions. It will also absorb the unskilled laborers of the A. F. L.

The Connecticut Master Plumbers' Association met here recently. Judge Robert L. Munger, of Ansonia, delivered the keynote speech, in which he berated both employer and employee for the orgy of greed and selfishness which is at present sweeping the country.

An explosion either of a stick of dynamite or a bomb on the veranda of the house of John H. Goss, secretary and general manager of the Scoville Mfg. Co., partially wrecked the piazza and broke several panes of glass in the sun parlor of the Goss home early May 31. It is suspected, though not proven, that the explosion was the result of a deliberate attempt on the part of some fanatic-striker here to take Mr. Goss's life. The sun parlor is directly under his bedroom window. The police here have made no arrests as yet and are still working on elusive clews as to the perpetrator of the crime.

Mr. Goss and his family and several school-friend-guests of his daughter, Elizabeth, had just retired for the night when the explosion took place. No one was injured. Mr. Goss states that he had received no threatening letters and had no idea who committed the crime. Luigi Scalmana, president of the Waterbury workers' association, expressed his sorrow over the incident and disclaimed any liability on the part of the strikers for the incident.

George M. Beach, superintendent of police, however, indirectly laid the blame on aliens saved from deportation by Louis F. Post, Assistant Secretary of Labor, who have returned to Waterbury.

"It was plainly a deliberate attempt to assasinate Mr. Goss," said Mr. Beach, and only the ignorance of the criminals prevented the attempt from turning out differently. The stick of dynamite exploded within 15 feet of where Mr. Goss was sleeping. I am unable to say just now whether some anarchist individuals among the strikers made the attempt or not.

"One thing is certain, however, and that is that anarchist agents arrested by the Department of Justice agents in the raids of last March have returned here. They are active in agitation and we have been compelled to keep them under serveillence. So far as I know not a single one of the prisoners taken here in raids were ever deported. Many have been released by Secretary Post.—D. H. P.

TORRINGTON, CONN.

JUNE 1, 1920.

Difficulty in securing shipments of materials and fuel is badly hampering activities in all the metal industry plants in Torrington. The fuel situation has several times reached a critical stage with complete cessation of activities imminent, but to date the manufacturers have been able to pull through without shutdowns. Shortage of materials, due to transportation tieups, has necessitated curtailments in certain departments of several of the shops, however.

Owing to uncertainty of prices, most of the manufacturers are booking orders only on prices ruling at date of delivery. No contracts are being taken except on the cost-plus basis.

A bulletin sent to members of the Manufacturers' Association of Connecticut during the latter part of the month called attention to the fact that the railroads of the United States had requested the interstate commerce commission to exercise its emergency powers under the law by issuing an order restricting movements of freight to prime necessities such as food, fuel, etc. E. K. Hubbard, of Middletown, president of the association, filed with the state public utilities commission a protest against the proposed action. Some of the reasons cited in his protest were:

"The proposed order would inevitably close down quickly a large number of our industries. This would mean stoppage of earnings of thousands of workers. There is now in Connecticut no serious shortage of any necessity of life, nor is any such shortage immediately threatened. There is no danger to the public from the slow movement of coal except as the industries may be forced to suspend for lack of fuel. Now that the roads have been returned to private ownership it is better that the interference of the government be not invoked until absolutely necessary for public safety. What is needed is more transportation rather than less; an increase of their efforts by the railroads rather than an arbitrary lessening of the demands upon them at the expense of the public."

Metal plants in Torrington have been comparatively free from labor troubles despite the strikes in the neighboring city of Waterbury. Union carpenters employed here went on strike early in the month for a uniform wage of $1 per hour. The old rate was 60 cents. A compromise offer of 85 cents was made and the men returned to work.

The extension of Mason street, an improvement urged by John F. Alvord, of the Torrington Company, was approved last month by the borough voters The Torrington Company has awarded the contract for a $175,000 hotel addition on Main street. This company a few years ago purchased Conley Inn and has conducted it as a hotel since January 1. During the period of the war, the building was used to house young women employes of the company. The addition for which the contract has just been awarded is to be three stories high, with stores on the ground floor and 30 hotel rooms with baths on the upper floors. It will be of brick construction. The Torrington Building Company has the contract.

The Torrington Company has purchased the E. A. Perkins property on Maiden Lane, adjoining the Conley Inn property. The deal, it is said, involved $25,000.

Francis H. Griffiths, treasurer of the Turner & Seymour Manufacturing Company, has been elected president of the Torrington Y. M. C. A., succeeding Harry J. Wylie, resigned.

Lester J. Ross, of the Torrington Company, delivered an address on "How Needles Are Made," at one of the May meetings of the Rotary Club.

The plant of the Bridgeport Castings Company, owned by former Torrington men, is being operated again. It had been visited by a serious fire in February.

William Stewart, of Torrington, is named as an incorporator of the Walker-Stewart Foundry Corporation of Meriden, which filed a certificate of organization during the past month.

Miss Ruth Norton, daughter of W. P. Norton, who was for many years superintendent of the Hendey Machine plant, is to be married in August to Norman Thompson, who is engaged at the Standard plant of the Torrington Company. Mr. Norton's son, J. Richard Norton, is to be married in October to Miss Marguerite Case.

The Hendey Machine Company is having its property on Brooker street graded in preparation for the erection of a new foundry building at some future date.

Two freight cars and a work car were demolished and the lives of two-score passengers were endangered on May 2, when a southbound passenger train ran into an open switch outside the Excelsior Needle plant. A 15-year-old boy was later arrested and confessed that he opened the switch. He was found to be a mental defective.

Clark Bennett, of Thomaston, formerly of Torrington, has begun his duties as plant engineer at the factory of the Hendey Machine Company. He has charge of development and improvement work at the plant. Mr. Bennett was formerly with the Coe Brass Company and has had wide experience as a supervising engineer of factory construction and development.—J. H. T.

NEW BRITAIN, CONN.

JUNE 1, 1920.

With Waterbury in the throes of a serious strike, in which not only the laborers, but also skilled mechanics are out, New Britain is particudarly fortunate in that there is not the slightest semblance of labor trouble here. Business at all of the factories is good and indications are that the summer months will see but little let-up.

Of particular interest is the announcement from the Superior Court in Hartford on May 28 that the suit of W. J. P. Moore, of New York, against the Stanley Rule & Level Company has been dropped. Mr. Moore, for many years a director and stockholder in the aforementioned concern, recently brought action in the Superior Court to have the merger with the Stanley Works set aside. Mr. Moore sought this action both as a stockholder and as a director, and although as a director he had officially sanctioned the merger, he claimed that it was due to a misunderstanding. Among other thinggs, Mr. Moore alleged that through the merger the Stanley Rule & Level Company was possibly attempting to avoid payment of government taxes, and was liable to civil action at some later period. After a preliminary hearing the suit was dropped. As far as is known, Mr. Moore is the only stockholder of the Stanley Rule & Level Company who has taken official action against the merger.

At the New Britain Machine Company every bit of energy is being directed to the production of the new farm tractors, and if the demand for these comes up to expectations this will soon be the principal output of this concern. Officials are optimistic concerning the future.

The P. & F. Corbin Division of the American Hardware Corporation, the Corbin Cabinet Lock branch and the Russell & Erwin branch, as well as the Corbin screw department of the same corporation are doing an excellent business in builders' hardware and the large amount of building going on about the country simply increases the work for these concerns which specialize in trimmings, door checks, transom rods, knobs, escutcheons, etc., for buildings.

Landers, Frary & Clark, manufacturers of cutlery and domestic articles such as vacuum bottles, vacuum cleaners and many electrical appliances and aluminum ware, are rushed to capacity, and the chances are that these conditions will continue, especially since the high cost of building materials and construction have made it necessary to cancel contracts for the construction of a new factory addition that was intended to handle a large amount of the aluminum trade.

The various big concerns in New Britain are among the largest employers of labor in Hartford county. Concerns like Landers, Frary & Clark, the American Hardware Corporation, the Stanley Rule and Stanley Works plants, are each employing in the neighborhood of 5,000 hands. Friendly relations are being maintained on the part of both employer and employee and the standard of help is very high, thousands of men owning their own homes. Some of the factories, appreciating the tenement shortage, have taken in upon themselves to erect many dwellings at their own expense which they are either renting or selling to their employees at very reasonable figures.—H. R. J.

BRIDGEPORT, CONN.

JUNE 1, 1920.

The threatened shutdown of the factories in this city on account of the fuel shortage has passed for the present, as coal is coming in sufficient quantities to keep the factory wheels turning.

In a number of the factories the supply was nearly exhausted when the coal began to arrive by water through Long Island Sound. With the prospects of the strike among the crews of the tug boats in New York harbor being adjusted soon, the managers of the many industrial plants here look to have their coal bins full in a short time.

Many of the alterations which have been planned by the General Electric Company to the factory used during the war by the Remington Arms Company have been completed, and the company intends to start operations in the big shop before the end of June.

Some of the leading officials of the General Electric Company's plant in Pittsfield, Mass., have been assigned to the Bridgeport factory, and Joseph P. Catlin, general superintendent, and Carl Lynge, assistant engineer, are now whipping things in shape for an early start.

The company expects to employ over 8,000 hands by winter and they will manufacture small motors and parts here.

The labor situation here has not improved during the past month, and the fact that some of the factories are bringing Spaniards into the city to take the place of men who have been in their employ for some time, is creating a feeling of unrest that may blaze forth in strikes before the summer is over.

HARTFORD, CONN.

JUNE 1, 1920.

Richard T. Higgins, chairman of the Connecticut public utilities commission, has written John E. Benton, general solicitor of the national association of railway and utilities commissioners, with headquarters at Washington, D. C., declaring that the Connecticut commission is in favor of an increase in the freight rates and emphasizing that it is vitally important that the New England industries and their transportation facilities should be carefully considered.

A permit was issued to the Royal Typewriter Company for the erection of a factory addition to its present plant, at an estimated cost of $275,603. With the issuance of the permit to the Hartford Rubber Works, the building department of the municipality announced that the total value of the permits issued for May will probably exceed the total for any year.

In an effort to aid Hartford coal dealers get shipments of bituminous coal through to this city, Congressman Augustine Lonergan has taken the matter up with the offices of the Interstate Commerce Commission, asking that attention be given to Connecticut needs. He was advised that orders have been sent to western and middle western roads to rush empty cars east to the coal mining districts and to allocate enough for Connecticut needs.

F. H. Frissell, formerly superintendent of the Russell Manufacturing Company, will head a $100,000 corporation which will take over the Higganum mills formerly owned and operated by the Russell Manufacturing Company, and recently bought by L. P. Perry, of East Hampton.—W. A. L.

PHILADELPHIA, PA.

JUNE 1, 1920.

Conditions in the metal industries of this city and neighborhood are not quite so encouraging as they were several months ago. Business is not so brisk as the optimists had predicted for the spring and summer months, and the prospects for steady prosperity are not promising. This slackness is not due to any lack of necessity for production, but is the result of accumulated bad deliveries by railroads, the incessant demands of labor, and the mounting costs of all kinds of materials and finished goods during the past year.

Except for some buying of heavy machine tools by the larger railroads the local manufacturers of machinery and equipment are somewhat dull. Little new business has been taken recently in many lines of mechanical manufacture, and indications are seen that cancellations are being made rather frequently on orders made since the first of the year. Even those concerns engaged in manufacture of automobiles or accessories are feeling the slump, as the demand for cars is said to be falling off very generally because of the fear of coming business depression. Local makers of cars, trucks, and parts are not expanding their capacities as had been expected several months ago.

Shipyards of the Delaware River are also getting slack, with many of them running under normal capacity. Some of the yards at Chester have been closed for several weeks on account of labor troubles, the managements preferring to close down temporarily rather than make concessions to further demands of labor. The great Hog Island yard has almost completed its assigned tasks, only a very few vessels being still on the ways, and no more keels have been laid for several months. When the last hull is launched within the coming few weeks, the yard will probably be silent. It is expected that proposals will soon be asked for the sale of the yard, and what will then be done with the property is a probem. Many proposals have been advanced for making the great shipyard into a shipping terminal or repair station for the Port of Philadelphia, but it is not likely that Hog Island will ever be again used as a great shipbuilding yard, unless in the event of another world war.

Some plants of the neighborhood are said to be preparing to reduce the number of workmen in order to cut operating expenses. None of the heads of these concerns will admit that the reductions are the result of falling off in demand for finished product, but because of the existing unstable conditions of transportation, labor and supply of materials.

The Precision Grinding Wheel Company has begun operations on a new building 95 x 265 feet, to cost about $100,000, on a plot of 7½ acres at Torresdale avenue and Wingate street. Seven other buildings are to be erected at a total cost of about $500,000. A. S. Vane is president and H. A. Plusch is manager of the plant.

The Hess-Bright Manufacturing Company, Front and Erie streets, manufacturers of ball bearings, has increased its capital stock from $2,000,000 to $2,500,000. Plans are completed for the erection of three one-story buildings, 32 x 295, 24 x 350, and 32 x 120 feet.

The Crane Company, 245 Master street, manufacturers of steam specialties, valves, etc., is planning to erect a building 60 x 200 feet to be used as a pipe shop.

The General Machine Supply Company, Sargent and Trenton streets, and the Abradant Products Company, Thirteenth and Walnut streets, makers of emery grinding wheels, have been merged under the name of the first company with a capital stock of $65,000.

The Victor Talking Machine Company, Camden, is preparing to erect a new addition to cost about $1,000,000.

Announcement is made that the American Metallurgical Corporation, with offices in the Franklin Bank Building, has been awarded contracts for the development of special alloys by the Branford Electric Company, of Branford, Conn., and the Brown Pyrometer Company, Philadelphia.

The Ajax Metal Company, 46 Richmond street, has filed plans for extensions and improvements to its branch works on Orthodox street near the Delaware River which will cost about $25,000.

Thorsten Y. Olsen, of the Tinius Olsen Testing Machine Com-

pany, of this city, addressed the Philadelphia Foundrymen's Association at the 297th meeting held on May 12 at the Manufacturers' Club, on the subject, "Recent Developments of the Testing Machine and the Testing of Materials."

The Auton Boat Company, with offices 407 Schubert Building, plans to erect a new one-story works 250 x 500 feet on Audalusen street, for the general manufacturing and assembling of boats. E. S. Nopolis is president.

The Bethlehem Motors Corporation, Allentown, Pa., is erecting new buildings on a site adjoining its present plant to cost about $1,360,000, including equipment. By August the concern expects to reach a production rate of 20,000 cars a year.—G. B. G.

DETROIT, MICH.

JUNE 1, 1920.

Detroit manufacturers, as well as those of the entire state, are battling with the most threatening transportation problem that has befallen them at any time since the great war started. Never in the history of this part of the country have such stupendous obstacles been faced, and the worst of it all is, there is no immediate prospect of conditions improving. The worn-out railroads are doing their best to meet the demands, but they are falling far short and haven't the facilities to meet half of what is required of them.

A survey covering the last four weeks shows that Detroit shipping facilities are about 50 per cent. of normal, and there is no doubt present conditions will remain for a long time to come. It is estimated that about 40,000 men have been thrown out of employment simply because the factories lack both fuel and the raw material with which to maintain production, and this in face of the fact that manufacturers have orders stacked mountain high. Every sort of scheme is resorted to in order to get supplies into the city. Many of the great automobile plants, such as the Dodge Brothers and the Ford Motor Company, are borrowing locomotives, and with their own traffic men are going down into the coal and iron fields and bringing back whole train loads of supplies. Such stunts as these cannot, of course, be done by smaller manufacturers, but even these fancy efforts are only giving partial relief to the hard-pressed automobile companies. Many of them are supplied with accessories and parts manufactured by brass and aluminum concerns hundreds of miles away. Shipments that have been on the road for weeks become lost and tracers often find them sidetracked far from where they should be. When cars of this kind are located they are pulled to the most convenient siding, the contents loaded on to motor trucks and taken directly to the plants. Often a three or four hundred mile journey is made. If a lake port is convenient the freight is transferred to a boat and the trip completed in that way. But all this is expensive and causing a great loss. But this is not the worst situation. Automobiles are bulky and it requires a good many cars to care for even a small consignment. It is now a case of "shipping on the hoof," and thousands of automobiles are driven away from Detroit every day. Every morning the front and rear of the Ford Motor Company's plant is jammed full of completed cars, the product of the night's work which, in an hour or so after daylight, start on their journey. It is the same at night from the day's product, which is on its journey long before midnight. This company alone is shipping thousands of cars in this way each day. When one considers that all the other companies are doing the same thing, some idea may be gained of road conditions for hundreds of miles from Detroit.

No one can tell what the future has in store for this section. Everybody is hoping for the best, and everybody is hanging on—but it is at a great expense.

Outside of the automobile industry general conditions in the brass industry are only fair, due altogether to prevailing handicaps. Building operations, especially in the residence line, are largely curtailed, and this, of course, lessens the demand for plumbing supplies and building hardware in general.

One of the newest brass and aluminum concerns in this field is known as the Dundee Foundry Company, Dundee, Mich. It has recently elected the following officers: President, M. J. Prestidge; vice-president, Dr. J. B. Hayes; treasurer, A. M. Ritter; secretary, Colburn Burroughs. These officers and Charles Post, Wade Waring, John Reum and Milo Van de Venter, make up the board of directors.

It is announced that a concern known as the Regle Brass Company is soon to be established in Greenfield, Mich. The industrial committee of the Greenfield Chamber of Commerce is said to have aided largely in disposing of the new company's stock.

E. B. Horne, former manager of the forge and foundry divisions of the Packard Motor Car Company, is now, it is said, devoting his entire attention to the Rochester, Mich., Foundry & Machine Company, of which he is president and manager. This company is engaged in an extensive production of brass and aluminum castings.—F. J. H.

ROCHESTER, N. Y.

JUNE 1, 1920.

The industrial situation in Rochester is in a serious way, so to speak, at this time, owing to the constantly decreasing surplus of metal supplies and the thoroughly demoralized railroad conditions. Finished products cannot be shipped away from the city with any degree of dispatch or certainty of delivery, nor can manufacturers obtain needed materials on time or in quantity. Express service is depended upon these trying days, and the results are very costly.

Owing to this condition and the frequent labor strikes in Rochester none of the big manufacturing industries of the city are employing additional help. In fact, it is said that many superintendents are quietly reducing here and there, and that unless the industrial atmosphere clarifies presently there will be serious shutdowns in the near future.

The Buffalo switchmen's strike and the trouble at Waterbury have seriously interfered with industrial activity in this city. A big user of aluminum was forced to obtain a supply from Pittsburgh last week by express. The cost was high, but the metal had to be obtained. Today purchasing agents insist that but from one-seventh to one-ninth of the supply of aluminum required in Rochester can be obtained. Brass sheets and rods are obtainable out of Buffalo, but nothing can be gotten east, and the stocks in Rochester are growing less every week.

The demand for copper is quiet at this time. The metal is said to be in plenty just now, but little is being received here owing to the rail situation. There is a fair demand for lead and the supply is sufficient for the time being. Tin is also difficult to obtain at this time, and the demand is strong. Spelter is in demand, but the supply is low. Bronze is in plenty.

Owing to the continued strike in the building trades about $3,000,000 in new factory buildings and machine shops have been deferred to 1921. The Eastman Company, however, will try to erect a new machine shop at Kodak Park.

The Rochester branch of the Electro-Platers' national association have about concluded final arrangements for their annual convention to be held here at the end of June. Much enthusiasm prevails among the members, owing to the prospects. The entertainment feature of the convention promises to be of an unusual and unique sort.—G. B. E.

PROVIDENCE, R. I.

JUNE 1, 1920.

Unsettled business conditions which have been apparent for several months in the stock markets, and have been extending to industrial and commercial circles, have been more acute during the past month as regards the various metal trades than at any time during the great unrest that has seized upon the country. Strikes and rumors of strikes have served to add to the general unsettled condition, causing further dissatisfaction alike with the manufacturers and the laborers. This, with the scarcity of help, has made the labor question one of the most serious ever experienced.

And as though the labor situation were not sufficient, the transportation tieup, freight embargo and coal shortages have added to the general turmoil. But the indications are that the worst of the transportation and freight difficulties have been passed and that there be a gradual improvement from now on. This will result not only in the shipment of productions, but will release for early delivery tons of material of all kinds that the industries of this section have been so greatly in need of.

The unprecedented prosperity in the manufacturing jewelry and allied lines has induced a large number of small concerns to enter the ranks of manufacturers in hopes of securing some of the

harvest while the business is on the crest of the wave. But there seems to be a tendency to slacken up in the rush conditions that have prevailed so many months. However, most of the firms are still busy. The situation among the jewelry manufacturers is summed up very comprehensively in the following statement made by a local manufacturer:

"As far as prices go we are not anticipating another advance, although, of course, with labor conditions as they are, we may be forced to increase some during the coming year. It may be that the action of the Federal Reserve Board regarding credit may tend to restrain business, especially regarding luxuries, under which head, of course, our product must come, but judging from present indications, there will be no immediate change, as we have more orders on our books than ever before for the corresponding time of year. It would seem in fact as though unless something unforeseen happens, that this year would be an unprecedented one in the jewelry industry.

"We ship all our product either by express or mail, and, of course, we have had a great deal of trouble with the former, owing to the embargoes, etc., but as you can readily see we can always send our goods by mail, so that we really have no serious difficulty in this direction.

"The greatest difficulty which we have to overcome at present is the labor situation, as it is almost impossible to obtain workmen who are skilled in the manufacture of finished jewelry, so that although there is absolutely no limit to the orders which we can obtain, yet our production is limited by the fact that we cannot obtain sufficient employees to take care of such orders. We cannot see any tendency toward increased efficiency of labor and we are only hoping that at some time in the future, conditions may change in this direction."

Notice has been filed at the office of the Secretary of State by the W. S. Hough, Jr., Co., manufacturers of rolled plate at 61 Peck street, this city, that the capital stock had been increased from $237,000 to $337,000.

The Martin Brass Foundry has been established in Providence with its place of business at 799 Eddy street. The concern, which was formerly located in Quebec, Canada, is engaged in the manufacture of brass and bronze castings and solder. P. A. Beaulieu is manager and president of the company.—W. H. M.

CLEVELAND, OHIO

JUNE 1, 1920.

"When will it end?" This is the topic uppermost in the minds of every leader in any branch of the city's business identified with the metal industry. The question asked is when the tieup of the railroads will end. Indirectly the action of operatives in railroad yards here as elsewhere throughout the country, has served effectually to slow down industry in every part of the community. Lack of material and fuel have been the principal factors at the beginning of this strike. In turn employees at many large plants have been laid off, and as the majority of the population of this city is of the laboring class, which has been surfeited with high wages and which wages have been spent quite as liberally, in most instances, as they were obtained, the buying power is diminishing accordingly.

These are not optimistic views, but they are cold facts that must be reckoned with at this time. Proof that the buying power has lessened is seen in the cutting of prices here, following the lead in other cities, by retailers who have held out to the last in the hope of unloading high priced merchandise.

Significantly Cleveland has been about the last big city to succumb to the changing conditions, and as in previous upsets of the commercial equilibrium, it is expected to be among the first to readjust itself. Therefore, satisfaction with the immediate outlook is anticipated. Chief drawback to extended activities, aside from raw material and fuel shortage, is the absence of basic building materials with which to carry on enlargements of plants. There is practically no plaster, cement or lime available, and as these are key materials, many plants which had been planned to be enlarged, are remaining as they are at present.

There is a tremendou amount of unfinished building standing at present. Much of this has reached the plumbing stage. This work is held up because plumbing interests have not sufficient materials or supplies with which to go ahead. And plumbing supply manufacturers here plead in vain for release of their materials, much of which has been tied up for months.

Reflection of the changed conditions also is seen in the plating end of the industry. The huge number of new cars that automobile dealers threatened to sell the public at the time of the automobile shows has not materialized, either as to number of cars expected, nor as to number of buyers to take them. On the contrary owners are having their old cars done over, and plating interests have come in for an abundance of refinishing work that surpasses anything of its kind at this season of the year, leaders in this branch of the metal industry assert.

In a general way it is estimated by Frank H. Baer, traffic commissioner of the Cleveland Chamber of Commerce, that the lack of proper transportation has cut industrial production here 50 per cent. Latest advices were that more switchmen and their associates are joining the strike, so that early relief from car shortage is not looked for.

The last two weeks have seen a significant change in the machinery situation which is a good barometer of general industrial conditions. Of the thousands of manufacturing establishments here, not a single inquiry for machinists, tool makers or the like has been advanced. Machinery interests point to this as a good indication of the needs of these establishments for new equipment, if it were not known already that these machinery requirements already are curtailed.

On the surface these conditions would look decidedly pessimistic. Quite the contrary is true. Leaders in all branches of manufacturing point to the fact that the country, indeed the world, is short of all forms of necessities. They assert that until this shortage is relieved, there will be no significant reaction, and therefore sum up the present situation as but a temporary one.

The time is being taken advantage of by employment managers, as members of the Manufacturers' and Wholesalers' Board of the Cleveland Chamber of Commerce, to plan dealings with employees for the future, generally on an even broader scale than in the recent past. At the May meeting of this group speakers heard included Sheldon Cary, chairman of the chamber's labor relations committee; Edward L. Green, secretary of the better business commission; Richard Feiss, chairman of the employment advisory commission of the Welfare Federation. Frank B. Gilbreth, nationally known as an expert on high speed photography applied to motion study, discussed that phase as a means toward gaining increased production and efficiency from employees, and used as a basis for estimating their greater worth to their particular institutions.

Among the significant individual steps toward improvement has been the adoption of the eight-hour day at the American Multigraph Company, after a conference between representatives of employees and the officials of the company. The decision was reached after it was learned that the same production would be obtained in eight hours as was obtained in ten hours. Employees have agreed that if production falls below the present level in six months nine hour days will return at the present rate of pay.

In the territory adjacent to Cleveland manufacturing and metal industry interests are going ahead with expansion plans, despite present handicaps. At Elyria, for example, the Enamel Pipe Company will erect a $30,000 addition; the Willys-Overland, Inc., a new $75,000 building, and the Worthington Ball Company a main building at a cost of $100,000, while the Columbia Steel Company plans a $30,000 addition. These are only a few of the projects planned and which show signs of early construction. Many others are in the planning stage still, but are expected to take definite shape as the rail and building situations clear.

One of the significant changes to be noted in both a personal and industrial way is the announcement of the retirement of R. W. Gallagher, assistant general manager of the East Ohio Gas Company, to become acting president and general manager of the Motor Castings Company at Canton, organized a year ago. Mr. Gallagher has been associated with the East Ohio for 21 years, first as a main line construction operator. He has held his present post for 10 years. Mr. Gallagher plans extensive expansion for the Motor Castings Company. The concern makes motors for trucks and tractors, and parts as well.—C. C. C.

CINCINNATI, OHIO

JUNE 1, 1920.

With labor conditions more or less unsettled and conservatism seeming to have the rail in the local end of the industry, there has been little, if any, change noted during the past month. Prices

have not come down, except perhaps in a very few obscure cases, but the tendency has not been for an upward trend. The raw material question continues to be a perplexing one. Transportation difficulties also have entered into the trade materially. It is difficult to do much shipping.

The demand for all kinds of finished products continues good and all the local plants are busy, with every prospect of keeping at full speed for many months to come. There is every indication in local circles that the industry is coming to the point where it will be more stabilized and there are those who predict that a decided change will be noted in the next three months at the latest.

Reversal of the judgment of $99,426, given in the Michigan Federal Court in favor of the Chicago Screw Company, and against the Michigan Copper and Brass Company of Detroit, is sought by the latter in an appeal to the Circuit Court of Appeals at Cincinnati.—H. C. L.

COLUMBUS, OHIO

JUNE 1, 1920.

The metal market in Columbus and central Ohio territory has been much weaker during the past month. Declines in prices were recorded in all metals with the possible exception of aluminum. All other metals, led by tin, have declined and a marked weakness developed. Buying of type metals and babbitt was active, but in the case of other metals it has been quiet to the extreme. Metal using concerns have fair reserve stocks and are not inclined to buy for the future to any extent. In fact, the policy is to buy from hand to mouth and let the future take care of itself.

Active arrangements have been started for the annual meeting of the American Foundrymen's Association, which will be held in Columbus in October. A committee of local foundrymen will soon be named to have charge of entertainment. The Columbus Chamber of Commerce will co-operate with the local committee in making entertainment arrangements and to secure a meeting place. The headquarters will be at the Neshler Hotel.

The Springfield Aluminum Plate and Castings Company, of Springfield, Ohio, has been chartered with a capital of $25,000 to manufacture castings and plate. The incorporators are: I. F. Hook, H. H. Simendinger, W. J. Jordon, W. Ream and E. H. Schuer.

Papers have been filed increasing the authorized capital of the Falcon Bronze Company, of Youngstown, O., from $25,000 to $300,000, to provide for additions and extensions.

The Holmes Bronze Foundry Company, of Cleveland, has been incorporated with a capital of $30,000 by R. F. Holmes, R. E. Fleming, E. H. Peck, W. Klie and J. H. Mills.—J. W. L.

TRENTON, N. J.

JUNE 1, 1920.

Labor troubles interfered somewhat in the operation of some of the Trenton metal plants during the past month. The polishers, buffers and grinders at the J. L. Mott plant who went on strike for more pay and less hours and were taken back again, after the company had knocked off a few hours a week, are out again. The men objected to working with non-union mechanics after the company had refused to dismiss the latter. There are only a handful of polishers and buffers at work and the different departments will have to shut down soon unless the strikers return to work.

The electrical workers who went on strike on May 1, are still out. They have been receiving $1 an hour and now want $1.25 for the same time. The employers held a meeting recently and decided to conduct open shops in the future. A number of new hands are being placed at work. The painters at the Mercer Motor Company's plant went on strike for a 20 per cent. increase in wages and their absence from the mill interferes with the other departments. The strike of the machinists is showing its effects at various plants where metal products are turned out. The largest plant affected is the John A. Roebling's Sons Company, where machinists are greatly needed. The company will have to close some of the departments if the strike continues. The men are paid 80 cents an hour and are now demanding 90 cents. A few firms signed the new agreement.

The McFarland Foundry and Machine Company will shortly abandon the old plant in East Trenton which it has occupied for many years and go to another location. The company had purchased a nine-acre tract on Brunswick avenue and has begun the erection of a modern plant. The N. A. K. Bugbee Company is now building a foundry on the new site, 50 by 120 feet, to cost $23,000. The C. Y. Barlow Company is erecting the office structure and later other units will be built. The McFarland company's business has greatly increased of late and additional room and buildings are needed.

The New Jersey Zinc Company, with principal offices in Newark, N. J., has filed an amended certificate with the Secretary of State at Trenton, N. J., increasing its authorized capital stock from $35,000,000 to $50,000,000. The new issue will be divided into 500,000 shares at $100 par value each. Edgar Palmer is president of the corporation.

The White Metal Manufacturing Company, 1006 Clinton street, Newark, N. J., plans to build a brick, steel and concrete powerhouse, to cost about $60,000.

The Hope Foundry & Machine Company, 525 Main street, East Orange, N. J., has been incorporated, with $125,000 capital, to manufacture foundry and machine supplies. The incorporators are Harry H. Picking, S. E. Lynch and Gordon Grand.

Burack Brothers, Inc., 85 Columbia street, Newark, N. J., has been incorporated, with $125,000 capital, to manufacture jewelry of various kinds. The incorporators are Harry Burack and Sarah Burack, of Nutley, N. J., and Chester G. Ballenbach, of Newark, N. J.

Continental Smelting and Refining Company, Newark, N. J., has been incorporated, with $25,000 capital, to refine precious metals. The incorporators are Edward H. Beck and Conrad S. Torresson.

Lippman's, of 128 Market street, Newark, N. J., has been incorporated at Trenton, N. J., with $25,000 capital, to manufacture various kinds of jewelry. The incorporators are Louis Lippman, of St. Petersburg, Fla.; Jacob Lippman, of Los Angeles, Cal., and L. J. Desenberg, of Newark, N. J.

Kohn & Company, 308-312 Mulberry street, Newark, N. J., have plans prepared for a three-story factory building for the manufacture of jewelry. The plant will be 75 by 100 feet and will contain 12,000 square feet of floor space. Two large vaults will be erected for the housing of dies and other valuables. Modern machinery, electrically-driven, for the manufacture of gold and platinum jewelry, will be set up.

The British-American Chemical Corporation, a New Jersey corporation, has started suit in the New Jersey Court of Chancery against the Borough of Ridgefield Park because the chief of police of that borough closed their plant, on the ground that it created a nuisance through offensive odors. It is stated in the bill of complaint that members of the police and fire department of Ridgefield Park entered the plant recently and, after extinguishing the fires under the boilers, closed the works. The plant remained in the possession of the borough authorities until the Court of Chancery issued a temporary order restoring the plant to the owners. The officers of the corporation declare that they have been manufacturing acids and other products since 1916 and that the plant is being operated in a scientific manner. They also declare that the plant is located in the manufacturing section of the borough.—C. A. L.

LOUISVILLE, KY.

JUNE 1, 1920.

Louisville copper and brass shops and the general run of metal working shops are good and busy at the present time, there being a steady stream of business coming in from northern consumers of finished and semi-finished material, including sheet work, castings, and specialties of various kinds. A number of the large shops that formerly handled heavy sheet work for distilleries are now making vacuum tanks and condensers.

Labor is scarce and very high, common labor costing around $4@4.50 a day, while molders have been getting 75 cents an hour, and are asking for 90, and indications are that the advanced price may have to be paid. A number of companies would enlarge their production if molders were to be had, but skilled workers are fully employed, and newcomers are few.

The Independent Brass Foundry has moved into its new quarters at 1716-18 Cedar street, where it has added three additional molding benches. J. W. Rademaker, manager, reports that the

plant is rushed with business, and has just recently secured an order for more than 100,000 castings for the Nordyke & Marmon Company, of Indianapolis, manufacturers of automobiles and milling machinery.

The Peerless Manufacturing Company, of Louisville, is planning to install a stove department in connection with its line of fireplace hardware, and also plans to increase capacity of the old sections. Inability to secure molders is the greatest drawback. The company recently completed selling its production for 1920.

Hines & Ritchey report a very active demand, and that the copper working shop is going at full speed, and has all that it can do.

The Standard Milk Machinery Company is having considerable trouble in getting shipments through from the Easton finished parts, and has been shipping specialties by express. Mr. Hines reported that he had one carload of stuff shipped by boat to a southern port, and rerouted by rail from there, so as to get delivery through the embargoes.

Albin Wunderlich, 73 years of age, retired secretary of the Ahrens & Ott division of the Standard Sanitary Manufacturing Company, Louisville, died at his home in Louisville on May 24, following a lingering illness. He was a native of Germany, but came to this country early, and started with the company as a clerk when a boy.

William E. Fitch, president of the Peerless Manufacturing Company, Louisville, and veteran manufacturer of fireplace hardware, died at the age of 73 years on May 22, following a long illness and stroke of paralysis on the day before his death.

The Automatic Light Switch Company, Louisville, capital $50,000, has been incorporated by J. W. Roberts, C. I. Pickrell and W. L. Scott. The debt limit is $50,000.

The Reciprocating Electric Tool Company has changed its name to the Electric Hammer Corporation, and the capital has been increased to $1,000,000, and debt limit placed at $300,000. James K. Jarvis is president.

There has been a big smash in prices of automobile supplies locally, dealers having cut prices 20 to 33⅓ per cent., having been heavily stocked, and fearing that markets will work lower.

It is reported that the Louisville Board of Trade has received advices to the effect that many Louisville workmen who have been in the North and East, attracted by high wages, are drifting back to Louisville, as a result of suspension of many concerns as a result of railroad and fuel troubles, along with reduced demand for some lines.

MONTREAL, CANADA

June 1, 1920.

Montreal manufacturers in the metal trades have had a serious setback this month owing to the brass and iron molders' strike, which has stopped one of the greatest business eras in the city's history.

On March 29, 1920, each employer was advised by Local 21 Independent Molders' Union of North America that they desired a conference with the employers relative to a change in working conditions and wages to take effect on May 1, 1920. On April 3 notices were sent out calling a meeting of employers on April 8 to consider the union demand. At this meeting a committee of employers was named to meet the union delegates and ascertain their specific demands.

The two committees met and the delegates were told that the union demand was for the 8-hour day and 90 cents per hour. Up to May 1 the molders had been paid 72½ cents an hour for a 9-hour day. After the employers' committee had reported back to a general meeting of employers it was decided to make the molders an offer of 80 cents an hour and 9 hours per day.

This offer was refused by the molders and the employers after reconsidering the matter made the molders an offer of the 8-hour day and 85 cents an hour.

This last offer was refused by the molders at a meeting held May 4 and a motion to strike being carried by a majority vote. As this was the final decision from the employers the molders did not report for work May 5.

The readiness of the employees and employers to come together in a spirit of fairness has been highly commended and indications point at this date that something will develop agreeable to both parties at the next meeting.

The organization of Dominion Engineering Works has been completed to make machinery and they have secured a large contract from the Laurentide Paper Company of Quebec. The organization of the various departments is well in hand and the company has taken over contracts held by the Dominion Engineering and Machinery Company. There is a large amount of business in the shops and the new company goes forward at once under most favorable circumstances. They have also affiliated with the Cramp Company of Philadelphia covering the manufacture of hydraulic turbines and other hydraulic equipment for the entire British Empire. By the affiliation of the two companies the same standards will obtain in the Canadian plant which will manufacture the types of hydraulic equipment designed and perfected by the Cramp Company and will have the benefit of the engineering skill and shop practice now in operation in the Cramp Company's plant. A large amount of non-ferrous metals will be used in their products.

The annual convention of the National Water Works Association will be held here on June 21 to 24 at the Windsor Hotel. There will be a large number of exhibitors of brass goods and water works supplies, and demonstrations will be held. Reservations have been made for 1,000 persons at the Windsor Hotel alone and it is expected to be one of the largest conventions held, as delegates and representatives from all over the United States and Canada attend this annual convention.

There is quite a demand for plumbing, steam and electrical brass goods at present, owing to the building boom which is prevailing all over Canada is residential property.

The Canadian Explosives Company may buy the Canadian Copper Products Company. A deal has been arranged and all that is now required to complete it is the sanction of the Copper shareholders, a special meeting of whom has been called for June 7th. It will be recalled that Dominion Copper Products Company was one of the subsidiaries created by Dominion Bridge interests during the war in connection with the handling of large orders for ammunition, the company being specially designed to supply copper bands and cartridge cases. The Canadian Explosives Company will be able to utilize the plant in connection with its own business for making brass shells.—P. W. B.

BIRMINGHAM, ENGLAND

May 24, 1920.

For three days in the last week of April production in the Birmingham brass trade was largely at a standstill owing to a strike, the first that has occurred in the trade for nearly a quarter of a century. The workmen of sixty or seventy firms in Birmingham, Wolverhampton and other parts of the district had given notice that they would cease work on the evening of Wednesday, April 28, unless the Award of the Industrial Court, which gave to the engineering and foundry trades an increase of 6s. per week with an equivalent addition to piecework prices was applied to the whole of the brass trade.

A conference was held the result of which was a compromise, the men accepting an offer by the employers of a flat increase of 4s. a week to both day workers and pieceworkers, plus 12½ per cent. for day workers and 7½ per cent. for pieceworkers, the increases to be given from the next pay day.

The interruption of work caused by the strike was peculiarly inopportune, as all sections of the brass trade have a large amount of work on hand and in many cases are much in arrears with deliveries. The trade, however, is in advance of some of the other Birmingham trades in its reconstruction work and is steadily overtaking the orders which during the past twelve months have been pouring in. Makers of all kinds of cabinet brass foundry are particularly well forward. Cast materials, however, are by no means in such good supply as stamped and other machine made brass work. Production since the war has been largely increased by the extension of drop forging and other mechanical methods. There is a good demand for all kinds of fittings and mountings for the furniture trade. The lock makers who for some time were very slow in completing their return to ordinary activities, are now turning out goods in fair quantities, though the trade is hampered by a difficulty in obtaining keys due to the reluctance of men to work on light castings on account of being able to earn more on heavier work.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

A new concern at Fort Worth, Texas, is the **Southern Plating and Re-tinning Company,** 4th and Throckmorton streets; Mr. Osborn manager.

The J. W. Richardson Foundry and Metals Corporation, Brooklyn, N. Y., has increased its capital from $15,000 to $30,000. They operate a brass, bronze and aluminum foundry.

The Goodells Foundry Company, Goodells, Mich., are in the market for one pit furnace and one band saw. They operate a brass, bronze and aluminum foundry, and a grinding room.

The Glass-Arthur Iron and Brass Foundry, Gastonia, N. C., is in the market for pig aluminum, pig copper and block tin. This concern runs brass, bronze and aluminum foundry and casting shop.

The Aluminum Goods Manufacturing Company, 15th and Franklin streets, Manitowoc, Wis., who had planned to build a two-story 60 x 350 ft. rolling mill at an estimated cost of $500,000, have postponed operations.

The New Holland Brass, Bronze and Aluminum Company, New Holland, Pa., has been incorporated with a capital of $20,000 by J. Morris Smith, John F. May and John A. Hoffman, to manufacture brass, bronze and aluminum castings.

The Marf Machine and Die Casting Company, Inc., has succeeded the Marf Machine Company, Inc., at 17-27 Vandewater street, New York City. The same organization, with increased capital and facilities, will continue in the management.

The Nukol Fuel Company, Toronto, Canada, is manufacturing "Nukol" an anthracite briquette for the Ontario market. One plant is operating in Toronto, another is in course of construction at Port Stanley, and three more are prospected within the next two years.

The Edna Brass Manufacturing Company, Reading Road, Cincinnati, Ohio, is erecting an addition to its plant to cost about $20,000. This concern operates a brass and bronze foundry, brass machine shop, tool room, grinding room and casting shop.

The General Bronze Foundry Company, Cleveland, Ohio, has been incorporated with a capital stock of $80,000, by H. R. Jamison, Cuyahoga Building; W. R. Daley, J. G. Bachman, F. X. Cull and others. They operate a brass, bronze and aluminum foundry.

Bearing Metals, Ltd., Montreal, has been incorporated with a capital stock of $50,000, by Ernest L. W. Saunderson, Norman McL. Campbell, Aime S. Bruneau and others, to make babbitts, solders, type metals and other white metal mixtures. They operate a smelting and refining department.

The National Bronze and Aluminum Foundry Company, Cleveland, Ohio, has under construction the first unit of a new plant, 150 x 200 ft., at the Belt Line Railroad and East 93rd street, and has placed contract for further extensions. They operate a brass, bronze and aluminum foundry.

The Brightwood Bronze Foundry Company, 369 Birnie avenue, Springfield, Mass., are breaking ground for a one-story foundry addition 55 x 65 feet; estimated cost $20,000. They have installed 25 pit fires, and are putting in 20 molding machines. They operate a brass, bronze and aluminum foundry.

The Standard Brass Casting Company, Oakland, Calif., has just completed an addition to their assembling room. They have entered into the manufacture of plumbing supply specialties. This concern operates a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room, plating, polishing and lacquering departments.

The Vulcan Louisville Smelting Company, 208 South La Salle street, Chicago, Ill., are erecting three steel buildings at their plant at North Chicago, one of which, 140 x 265 ft., will be completed within two weeks, after which two more, 100 x 100 ft. each, will be added with most modern equipment. This company does smelting and refining.

Cooper's Brass Works, Inc., Ogdensburg, N. Y., plans to purchase the distillery plant of J. P. Wiser & Sons' Co., Ltd., Prescott, Ont., Canada, and by making additions and alterations to convert same into a brass manufacturing plant. The cost is estimated from $30,000 to $40,000. Nothing definite has been decided as yet. Address R. J. Donohue.

The Vi Brass and Aluminum Company of Bryan, Ohio, opened a foundry at Massillon, Ohio, on April 22. William V. Crayne, formerly connected with the Lima Metals Foundry, Lima, Ohio, is manager. Vincent C. Kelley, of Massillon, has become active in the business. They operate a brass, bronze and aluminum foundry and casting shop.

The McPhilben Light Fixture Company, 264 Fulton Street, Jamaica, L. I., manufacturers of metal lighting fixtures, are considering plans for a two-story, reinforced-concrete addition to cost about $40,000, to be built as soon as prices come down. The company operates a brass machine shop, soldering, plating, polishing, japanning and lacquering departments. They also intend to do spinning and white metal casting.

The Imperial Brass Manufacturing Company, 1200 West Harrison street, Chicago, Ill., announces that its New York office will be located after May 1 in the Longacre Building, Suite 605, 42nd street and Broadway. This company operates a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room, spinning, stamping, tinning, brazing, soldering, plating, polishing, japanning and lacquering departments.

The Waukesha Brass Foundry Company, Waukesha, Wis., expects to occupy its new casting shop shortly after June 1. It is 50 x 260 ft., of brick and steel, and will cost about $35,000. New furnace equipment with Westinghouse auxiliaries has been purchased. The present capacity will be increased 100 per cent. C. C. Smith is president and general manager and E. J. Doyle superintendent. They operate a brass and bronze foundry.

The Brantford Brass Foundry Company, Brantford, Ont., Canada, have erected a foundry building 20 x 30 ft. on their property 40 x 165 ft., at 22 Leonard street, commencing operations about June 1. They have coke fired stationary furnaces, and are contemplating further extensions, and the installation of an electric melting furnace. They do brass, bronze and aluminum casting for custom trade, and also manufacture a staple line of brass goods. They also operate a brass machine shop and polishing department. David L. Webster is manager and Richard Hart superintendent.

Wm. H. Flavin & Company have moved from 247 Centre street, to their new home at 313 East Twenty-second street, New York City. In their new headquarters, with 10,000 square feet of floor space they are very well equipped for all kinds of plating. One of their specialties is barrel plating and tumbling of small work. They have tanks large enough to plate pieces up to 25 feet long and 4 feet wide; they are also fully equipped for hotel work of every description, for boat work and automobile parts. They carry all kinds of platers' and polishers' supplies and can furnish equipment for plating plants complete.

The Midland Brass Works, Fort Worth, Texas, has been incorporated with a capital stock of $25,000, by Arthur D. Hodgson, W. B. Sloan and J. L. Boicourt, to manufacture bronze, brass and kindred products. They have bought out the plant operated under the same name, formerly owned by the Texas Manufacturing Company. J. L. Boicourt, who entered the employ of the latter concern 20 years ago, is president and general manager. The new firm will manufacture well pumps and similar articles. The capital has been all paid in, and they expect to double it at once. They operate a brass, bronze and aluminum foundry, brass machine shop and tool room.

The Furnace Problems Company, under the management of E. Schmatolla, chemical and combustion engineer, have established an experimental furnace plant, laboratory and workshop at 250 South Twentieth street, Newark, N. J., where they will solve furnace high temperature problems, and investigate fuel economy, smoke prevention, designing, improving. They will also design, improve and build furnaces and heat, treat, melt, etc., commercial samples under factory conditions. The development of patents will also be given attention. The address of their New York office is E. Schmatolla, 217 Broadway, Room 610.

E. G. Michaelis, formerly vice-president and manager of the **Midwest Brass & Copper Company, Inc.),** and E. P. McIntire, formerly secretary and sales manager of the same company, are now associated with the **Mohican Brass & Copper Works,** with offices at No. 107 Liberty St., New York, and warehouse at Bush Terminal, Brooklyn. They have taken over the management of this company, which intends to carry at the warehouse a well assorted stock of metal products, such as Brass and Copper Rods, Sheets, Tubing, Wire, etc.

The Chapman Valve Manufacturing Company, Indian Orchard, Mass., has let contracts for the erection of a 1-story 160x200 ft. plant; estimated cost $75,000. This firm operates a brass and bronze foundry, brass machine shop, tool room, and grinding room.

The Rome Metals Products Company has moved its office from 150 Nassau street to 23 West Forty-third street, New York. This concern operates a bronze and aluminum foundry, brass machine shop, tool room, grinding room, casting shop, cutting-up shop, plating, polishing, japanning and lacquering departments.

The Willcox Crittenden Company, Middletown, Conn., marine hardware makers, have bought 25 acres in Portland, Conn., with a river frontage of 1,000 ft., on which they will erect a concrete foundry building. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room, galvanizing, tinning and polishing departments.

The Mt. Carmel Manufacturing Company, Mt. Carmel, Conn., has let contract for 52 x 111 ft. machine and finishing shop, to cost about $20,000. They operate a brass foundry making plumbers' specialties. The new building will be used to expand their present line and develop a line of brass trimmings for automobiles. They will make their own tools and patterns and do machining, finishing and plating. Their present building will be used exclusively as a foundry.

The Booth Electric Furnace Company, Chicago, Ill., announces the consolidation of their executive and sales offices at the same address as the engineering and production office, which has been located at 326 West Madison street, where adequate office space and facilities have been secured to take care of all departments. Effective May 1, this will be the address of the general offices of the company. The company reports a number of additions to its sales and engineering staff.

B. G. Tarkington, formerly Industrial Heating Engineer with Hodenpyl-Hardy Company, Jackson, Mich., is located at their Chicago office in charge of district sales. The Buckeye Products Company, 919 West Fifth street, Cincinnati, Ohio, who have charge of sales in the Cincinnati territory, have placed D. E. Carpenter, formerly of the Detroit office of the Westinghouse Electric and Manufacturing Company, in charge of sales of Booth furnaces in that district. Among the foreign offices recently opened is one for Australasia in charge of Bartholomew Bannon, 321 Pitt street, Sydney, Australia. Mr. Bannon is well known in the engineering profession, and has specialized particularly along electro-metallurgical lines. The district sales offices of the company now are Edward B. Stott & Co., 175 Fifth avenue, New York City; Northern Engineering Company, 308 Chestnut street, Philadelphia, Pa.; Charles L. Foster, 879 The Arcade, Cleveland, Ohio; M. A. Beltaire, Jr., 805 Hammond Building, Detroit, Mich.; Gassman & Cunningham, Brown-Marx Building, Birmingham, Ala.; Buckeye Products Company, 919 West Fifth street, Cincinnati, Ohio.

The sales of the rotating brass furnace have been secured rapidly since this type of equipment was placed on the market last Fall. Thirty-five furnaces of this design have been sold, of which seventeen have been shipped, and nine placed in operation. Each furnace has started off without difficulty, and has met the guarantees made. The design of the various size furnaces has been completely standardized, and the shop of the company is now working on a production basis, with adequate facilities for turning out furnaces in from six to eight weeks' time from date of order.

REMOVAL NOTICE

The International Chemical Company announces that owing to the increasing demand for their services, their special cleaning and lubricating compounds for the metal trade, have moved from their old quarters at Camden, N. J., to their new plant and laboratories on Mascher street below Lehigh avenue, Philadelphia, Pa. Here their new factory buildings and a separate structure for the general offices and laboratories can easily accommodate the entire business.

S. D. Benoliel, president and general manager of the company, has spent his entire career as a student of the metal trade in respect to its cleaning and lubricating problems. Graduating from College of the City of New York and Columbia University with the degrees of A.B., A.M. and E.E., Mr. Benoliel went to Niagara Falls, where he erected several chemical plants and succeeded in making caustic potash by the electrolytic method in commercial quantities for the first time in this country. It was at this place, over twenty years ago, that he first started studying the metal trade. He then founded the International Chemical Company in Camden, where he did extensive laboratory and field work.

Specialties for the cleaning and preparing of the metal surfaces for plating, dipping, tinning, galvanizing, etc., as well as japan and lacquer removers and lubricating compounds for stamping, blanking, drawing and forming have been the chief output of the company.

NO LET-UP IN EXPORTS

Figures published by Department of Commerce show that our foreign commerce boom has outlived the war and is continuing with undiminished strength. But the force of this movement is best brought home by considering the exports of such of our national industries as were comparatively unimportant before the war. There is, for instance, the American cutlery industry. The Department of Commerce says that this industry exported goods valued at $1,209,256 during the month of February of the present year. The total exports of this industry amounted to only $1,142,148 during the whole year of 1913. Of course, cutlery prices have gone up since that time, but there remains the fact that according to value more cutlery is exported today during one month than during a whole year before the war. The cutlery industry is at home in many cities of the U. S. These exports, therefore, come from many factories and thousands of American wage earners derive from them part of their livelihood.

Cutlery exports show a new increase during February when American cutlery valued at $1,209,256 was exported against $943,785 during February, 1919, and $755,945 in January, 1920. The present fiscal year is the best export year the American cutlery industry has had so far and during the eight months ending February, 1920, cutlery exports amounted to $6,674,502 against the $4,051,312 during the same period of the preceding fiscal year.

NATIONAL TRAFFIC LEAGUE

The summer meeting of the National Traffic League will be held at the Bellevue-Stratford Hotel, Philadelphia, Pa., Thursday and Friday, June 17 and 18, 1920. Information can be obtained from E. F. Lacey, assistant secretary, 5 N. La Salle St., Chicago, Ill.

TRADE PUBLICATIONS

Heil Foot-Ampere Meter.—A folder explaining the operation of this ampere meter, published by the Coleman Lamp Company.

Mellon Institute of Industrial Research of the University of Pittsburgh.—Seventh Annual Report of the Industrial Fellowships of the Mellon Institute, by Raymond F. Bacon, Director.

Temperature Control.—A folder issued by the Robertshaw Manufacturing Company, illustrating the thermostatic, automatic temperature control system, for industrial uses. It includes a list of uses and users.

Patent Recuperator System Furnaces.—A catalogue explaining the work of Eugene Wuerz, 88 Van Dyke street, Brooklyn, N. Y., designer and builder for the glass, enamel and other industries, which use muffle furnaces.

Centrifugal Clarification of Varnishes, Japans and Pigment Goods.—Bulletin No. 200, issued by the De Laval Separator Company, 165 Broadway, New York City. Illustrating and explaining their centrifugal separator for varnishes and japans.

Alloys for Electrical Resistance.—A catalogue published by the Driver-Harris Company, Harrison, N. J., with tables of sizes, resistance, weights, etc., of a number of their electrical resistance alloys. A very useful and well made up catalogue.

Buffing and Polishing Machinery.—Bulletin 1200, published by the A. P. Munning Co., New York City, illustrating and describing such machinery. It is a very complete bulletin

covering motor driven and belt driven types of lathes and grinders.

Hydro-Electric and Steam Power Plants.—Bulletin No. 9, issued by Velie, Blackwell and Buck, 49 Wall street, New York City. A catalogue printed in English and Spanish, profusely illustrated, giving an idea of the work carried on by that concern.

Nicrome.—Bulletin N-21, issued by the Driver-Harris Company, Harrison, N. J. A catalogue giving size, weights, etc., of carbonizing boxes, lead tempering pots, cyanide and salt pots, etc. It also includes a line of products of the Driver-Harris Company and some data on Nichrome.

Equipment and Supplies for Brass, Bronze and Aluminum Foundries.—Catalogue No. 50, published by the S. Obermayer Company, Chicago, Ill., well illustrated and conveniently subdivided into sections, covering the melting room, moulding room, core room, pattern shop, and cleaning and finishing room.

The Most Effective Type of Industrial Organization.—A booklet issued by C. E. Knoeppel and Company, Industrial Engineers, New York. This is blue book series No. 1. It is punched to fit a standard 7¼ by 4¼ 3-ring binder. The book will be very interesting to all manufacturers and industrial organizers.

Tin and Terne Plate.—Bulletin No. 8, issued by Velie, Blackwell and Buck, 49 Wall street, New York City. This catalogue shows the process in the manufacture of tin plate from the sheet bars to the finished product. It is attractively printed, with clear, interesting illustrations, and includes considerable information on tin plate.

Electrometallurgical and Electrochemical Industry in the State of Washington.—A booklet submitted in partial fullfilment of the requirements of the degree of master of sciences in metallurgical engineering. It includes among other topics, water power in the State of Washington, cost of power, present status of the electrometallurgical and electrochemical industries and the possibilities of these industries.

The Care and Operation of Modern Foundry Equipment.—A loose-leaf booklet of bulletins issued by the Foundry Equipment Manufacturers' Association, Cleveland, Ohio, on the following topics:

1. Your body as a machine.
2. The foundry as a poor engine room.
3. Sand as a lubricant.
4. Foundry versus machine shop.

METAL STOCK MARKET QUOTATIONS

	Par.	Bid.	Asked.
Aluminum Company of America	$100	$525	$600-700
American Brass	100	220	195-205
American Hardware Corp.	100	157	135-140
Bristol Brass	25	34	25- 29
International Silver, com.	100	30	30
International Silver, pfd.	100	92	95
New Jersey Zinc	100	240	204-208
Rome Brass & Copper	100	280	128-135
Scovill Mfg. Co.	100	400	390-420
Yale & Towne Mfg. Co.	..	250	275-285

Corrected by J. K. Rice, jr., & Co., 26 Wall Street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE

COPPER.

The transportation tieup, due to shortage of labor and lack of necessary railroad equipment to carry freight, was a serious handicap to all business during May. These influences combined with the reaction in London affecting prices of metals, acted as a deterrent upon demand from consumers which resulted in light buying, there being small incentive to make purchases under existing circumstances. A disposition to wait for a clearing up of the situation prevailed. At the end of the month, there had been effected some improvement, particularly in the West, but in the East, where some refineries that had been obliged to shut down temporarily, had again started up, it was estimated that May production would average under, rather than over, 50 per cent. of capacity. Prices naturally receded. Producers' quotations, after being held early in the month at 19.25c. for prompt and second quarter electrolytic, delivered, were on May 6, quoted at 19.00-19.25c. and third quarter after being held at 19.50c. was quoted at 19.25-19.50c., delivered. These prices nominally prevailed over the remainder of the month.

In the outside market, prompt prime Lake, at the beginning of the month, was held at 19.00c., electrolytic at 18.50c. and casting at 18.37½c. per pound. By May 10, electrolytic and casting were off ⅛c. per pound on all positions, Lake remaining unchanged. In another week Lake declined to 18.75c. On May 20, electrolytic and casting again declined and five days later prime Lake was down to 18.50-18.75c., electrolytic to 18.00c. and casting to 17.75c. The total decline was ½c. per pound on prime Lake and electrolytic and ⅝c. per pound on casting copper. Export business in copper, while not so large as in previous months, was in better volume, proportionately considered, than domestic transactions.

TIN.

The downward tendency in prices of tin continued during May, when quotations registered a break of 10.75c. per pound, from the highest, 61.00c. May 1-3, to the lowest 50.25c. May 26, for spot Straits metal in New York. Owing to some recovery in the closing days, however, the net decline for the month was not so great, the difference between prices on the first, 61c. and prices on the last day, 52.25c. amounting to only 8.75c. Other brands of tin followed fluctuations in prices of Straits ranging ¼c. to 1.00c. per pound below. At the lowest point, May 26, when spot Straits was down to 50.25c., American pure was available at 50c., Banca at 48.50c. and 99 per cent. tin at 48.25c. per pound, these figures being the lowest prices of tin since February, 1917, more than three years ago. The volume of business transacted was less than in April, being of a spasmodic character, due to the more or less pessimistic outlook in all branches of industry because of strikes and traffic difficulties. Arrivals in May were very heavy, there having been reported by May 26, 5,880 tons at Atlantic ports and 350 tons at Pacific ports, while 1,355 tons were afloat.

LEAD.

As a result of the strikes and railway embargoes prevailing in May, there was a scarcity of lead in the New York market throughout the month, although plentiful supplies were available in the West. The break in prices at London and a difference between prices in the outside market, which was below those of the leading interest, were reasons influencing the decline on May 7, when the American Smelting & Refining Co., reduced its basis ¼c. per pound from 9.00c. East St. Louis, 9.25c. New York, to 8.25c. East St. Louis, 8.50c. New York, these figures remaining unchanged during the remainder of the month. In the outside market, however, prices advanced gradually to 8.55c. East St. Louis, 8.80c. New York by May 17, for prompt and early shipments, while June and July were offered about 30 points less. Owing to the scarcity in New York, thereafter, prices advanced in the East, while at East St. Louis, they were stationary. The net result of fluctuations amounted to ⅛c. decline in the outside market, when prices on the last day were 8.90c. at New York, 8.55c. at East St. Louis. Demand for lead was steady, the scarcity at New York being the feature when the month ended.

ZINC.

Transportation difficulties and labor strikes reduced the zinc market to an almost stagnant condition during May, there being no incentive for either buyers or sellers to enter the market until the situation showed improvement. Prices fluctuated within a range of 40 points per pound, from the highest at the beginning of the month, to the lowest, 7.50c. East St. Louis, 7.85c. New York on May 27, for prompt, June, and third quarter positions. A recovery of 10 points on May 28 was due largely to foreign

influences, the advance in prices at London, and the higher sterling exchange rates. Foreign buying has been the main support of the zinc market for several months past, but domestic demand is improving, particularly for brass special, which was sold at 8.00c. East St. Louis, toward the end of May, this being more than the usual ⅛c. per pound, premium.

ALUMINUM.

Increased demand for aluminum was experienced in May, prices remaining at the level of quotations prevailing at the end of April, throughout all of May. The leading interest has entire capacity for 1920 sold at 33c. for virgin 98-99 per cent., 31.50c. for No. 12 and 44.20c. for sheet 18 ga. and heavier. Other interests quoted 31.50-32.50c. for virgin, spot New York, bid and asked prices, with 32c. paid for large quantities and 32.50c. for small amounts. Remelted 98-99 per cent. was sold at 31.75c. and No. 12 alloy at 30.50c., small lots of the latter bringing as high as 31c. per pound in the outside market. Present indications in the aluminum market point to higher, rather than to lower, prices, foreign producers being oversold.

ANTIMONY.

The decline in prices of antimony continued in May, the drop being 1⅛c. per pound from 10.00c. duty paid, New York on May 1, to 8.87½c. for wholesale lots on May 28. Large supplies and light demand tell the reasons for the decline. Jobbing business was done at premiums ranging ⅛c. to ¼c. per pound over wholesale prices.

SILVER.

Prices of silver continued to trend downward in May, declining to the lowest level, 99¾c. on May 14, and remaining stationary thereafter until May 22, when the tide turned, carrying upward gradually to $1.02¼ on May 26. Following this recovery there was another decline to $1.00 May 28, the closing being 99⅝c., making the net decline 10⅞c. The high prices of silver which have prevailed for so long are due to a combination of reasons, first of which was, and still is, decreased world production of the metal. Not only has production in the United States fallen off, but in Mexico where output in the past five years, owing to internal disturbances, has averaged only 30,000,000 ounces, as compared with 74,000,000 ounces, previously. Second, the world war, which caused enormously increased demand in the Far East. China, in 1919, bought 182,000,000 ounces, this being the equivalent of entire world output. An important factor is the fall in British Exchange and the fact that the United States is pledged to pay on the basis of $1.00 per ounce for most of the world's new silver.

Importations of silver during first quarter 1920, according to U. S. Bureau of Commerce statistics, amounted to $30,775,636, the heaviest arrivals being $12,471,417 in February. Exports of silver in first three months 1920, according to same authority, were $54,431,366, the heaviest outgo being in January. The excess of exports over imports in the first quarter, therefore, amounted to $23,655,730.

QUICKSILVER.

Prices of quicksilver during May fluctuated within a range of $20 per flask of 75 pounds, from the highest, $100 May 3, to the lowest, $80 May 28, representing a decline of $20 per flask. Exports of quicksilver in March, 1920, were 25,055 pounds valued at $25,936.

PLATINUM.

Prices of platinum in May continued to decline, falling from $115 May 3, to $95 per ounce on May 19, making total decline of $20 per ounce for pure. Importations of platinum, according to Bureau U. S. Statistics, during first quarter 1920 were heavy, 9,464 ounces, including unmanufactured 6,689 ounces, manufactured ingots, bars and plates 2,664 ounces and vases, retorts, etc., for chemical uses 120 ounces. The total valuation was placed at $1,181,704. It is interesting to note that the downward trend has now carried to the lowest since January, 1917, the average for that month being $87.83 per ounce.

OLD METALS.

Shipping difficulties all over the country during May, seriously interfered with business in old metals; the outlook at the end of the month, however, showed some improvement in general conditions. Price reactions were evident in all lines, the heaviest in old metals being a cut of 6c. per pound to 34c. on pure tin foil. No. 1 pewter was down 5c. to 33c. and light brass 1½c. to 7.75c. per pound. New brass clippings and clean red car boxes, each, were off 1c. to 10.50c. for the former, and to 13c. for the latter. All the coppers suffered; light copper ¼c. to 13.75c., strictly crucible copper ¾c. to 15.75c. and uncrucibled wire 1¼c. to 15c. per pound. The aluminums suffered less than other items, clippings holding firm at 26c., while old sheet and old cast were each off ½c., the former to 23.50c. and the latter to 23c. per pound. Lead scraps, too, declined ¼c. per pound, heavy lead to 7c., tea lead to 5c. Government scrap in large quantities still lies unsold in dealers' warehouses.

WATERBURY AVERAGE

Lake Copper. Average for 1919, 19.55. 1920—January, 19.25. February, 19.125.—March, 18.875.—April, 19.125.—May, 19.00.

Brass Mill Zinc. Average for 1919, 8. 1920—January, 9.75. February, 9.40.—March, 9.15.—April, 8.85.—May, 8.30.

MAY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
Copper:			
Lake	19.00	18.50	18.85
Electrolytic	18.50	18.00	18.283
Casting	18.37½	17.75	18.189
Tin	61.00	50.25	55.069
Lead	9.00	8.60	8.787
Zinc (brass special)	8.15	7.90	8.008
Antimony	10.75	8.87½	9.444
Aluminum	32.50	31.50	31.95
Quicksilver (per flask)	$100.00	$80.00	$89.975
Silver (cts. per oz.)	110½	99⅝	102.5

Metal Prices, June 1, 1920

NEW METALS

	Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Electrolytic, carload lots	18¼-19.00
Lake, carload lots	18¾
Casting, carload lots	17¾
TIN—Duty Free.	
Straits or Australian, carload lots	51.50
LEAD—Duty Pig, Bars and Old, 25%; pipe and Sheets, 20%. Pig lead, carload lots	8.50-8.90
ZINC—Duty 15%.	
Brass Special	8⅛
Prime Western, carload lots	8.00-8.05
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	....
100-lb., f. o. b. factory	....
Ton lots, f. o. b. factory	32-33
ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	8.80
NICKEL—Duty Ingot, 10%. Sheet, strip, strip and wire, 20% ad valorem.	
Ingot	43.00
Shot	43.00
Electrolytic	45.00
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	$1.60-$1.85
BISMUTH—Duty free	$2.70-$3.00
CADMIUM—Duty free Nominal	$1.40
CHROMIUM METAL—Duty free	Nominal
COBALT—97% pure	$2.50-$3.00
QUICKSILVER—Duty 10% per flask of 75 pounds	$80
PLATINUM—Duty free, per ounce	$95-$100
SILVER—Government assay—Duty free, per ounce	.99½
GOLD—Duty free, per ounce	$20.67

Metal Prices, June 1, 1920

INGOT METALS

Silicon Copper, 10%	according to quantity	49	to55
Silicon Copper, 20%	" " "	36	to40
Phosphor Copper, guaranteed 15%	" " "	26	to33
Phosphor Copper, guaranteed 10%	" " "	25	to32
Manganese Copper, 30%	" " "	65	to72
Phosphor Tin, guarantee 5%	" " "	75	to78
Phosphor,Tin, no guarantee	" " "	62	to68
Brass Ingot, Yellow	" " "	14½	to16
Brass Ingot, Red	" " "	19	to22
Bronze Ingot	" " "	19½	to22½
Parsons Manganese Bronze Ingots	" " "	22½	to24
Manganese Bronze Castings	" " "	32	to42
Manganese Bronze Ingots	" " "	19	to23
Manganese Bronze Forgings	" " "	30	to40
Phosphor Bronze	" " "	24	to30
Casting Aluminum Alloys	" " "	32	to34
Monel Metal	" " "	38	to..

OLD METALS

Buying Prices.		Selling Prices.
16½to17½	Heavy Cut Copper	18 to18½
16 to16½	Copper Wire	17½to18
14½to15	Light Copper	16½to17
16 to16¼	Heavy Machine Comp.	17½to18
11½to12	Heavy Brass	12½to13
9 to 9½	Light Brass	10½to11
9 to 9½	No. 1 Yellow Brass Turnings	11 to11½
14 to14½	No. 1 Comp. Turnings	16 to16½
4.25	Heavy Lead	4.90
4.25	Zinc Scrap	5.00
10 to13	Scrap Aluminum Turnings	11 to14
21 to23	Scrap Aluminum, cast alloyed	23.50to25
24.00	Scrap Aluminum, sheet (new)	26.50
36.00	No. 1 Pewter	40.00
18.00	Old Nickel anodes	20.00
26 to28	Old Nickel	30 to32

BRASS MATERIAL—MILL SHIPMENTS

In effect January 7, 1920.

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.25¼	$0.27¼	$0.29
Wire	.25¼	.27¼	.29
Rod	.23¾	.28	.30
Brazed tubing	.37	..	.41¼
Open seam tubing	.37	..	.41¼
Angles and channels	.38	..	.42¼

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.26½	$0.28½	$0.30¼
Wire	.26½	.28½	.30¼
Rod	.25	.29¼	.31¼
Brazed tubing	.38¼	..	.43
Open seam tubing	.38¼	..	.43
Angles and channels	.39¼	..	.44

SEAMLESS TUBING

Brass, 30½c. to 32½c. per lb. base.
Copper, 32c. to 34c. per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	29½c. net base
Muntz or Yellow Metal Sheating (14"x48")	25¾c. " "
Muntz or Yellow Rectangular Sheets other than Sheathing	26¼c. " "
Muntz or Yellow Metal Rod	23¼c. " "

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	29½c. net base
From stock	32½c.-35c. net base

BARE COPPER WIRE—CARLOAD LOTS

22¾c. to 23¼c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order	31½c. per lb. base
100 lbs. to 300 lbs. in one order	32½c. " " "

ZINC SHEET

Duty, sheet, 15%. Cents per lb

Carload lots, standard sizes and gauges, at mill, 12½c. basis less 8 per cent.

Casks, jobbers' prices	14c.
Open casks, jobbers' prices	14½c

ALUMINUM SHEET AND ROD

Sheet Aluminum, base price, 54c. per lb. Coils 50c. per lb.

ROD.

B. & S. Gauge.

¼" to 1" Advancing by 32nds
1" to 2⅜" " " 16ths } 98% rolled, 43.10 cents per lb
2⅜" to 3½" " " 8ths

⅛" to ¼", 98% rolled and drawn 48.80 cents per lb

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c., over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 2c. over N. Y. tin price, 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs., 12c. over, 25 to 50 lbs., 15c. over less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

MONEL METAL

Shot	35
Blocks	35
Sheet Bars	40
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	56
Hot Rolled Sheets (base)	55

Lead Foil—base price—figured on base price of lead at the time.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 1.02½ to 1.05 per Troy ounce, depending upon quantity.

Rolled sterling silver, .98 to $1.01.

NICKEL ANODES

85 to 87% purity	.55c.	per lb.
90 to 92% "	.57½c.	per lb.
95 to 97% "	.60c.	per lb.

Supply Prices, June 1, 1920

CHEMICALS

Acid—		
Boric (Boracic) Crystals	lb.	.25
Hydrochloric (Muriatic) Tech., 20 deb., Carboys	lb.	—
Hydrochloric, C. P., 20 deg., Carboys	lb.	.10
Hydrofluoric, 30%	lb.	.40
Nitric, 36 deg. Carboys	100 lb.	7.28
Nitric, 42 deg., Carboys	100 lb.	7.90
Sulphuric, 66 deg., Carboys	lb.	.03½
Alcohol—		
Denatured	gal.	1.50
Alum—		
Lump, Barrels	lb.	.05½
Powdered, Barrels	lb.	.07
Aluminum sulphate, commercial tech	lb.	.15
Aluminum chloride solution	lb.	.16
Ammonium—		
Sulphate, tech., Barrels	lb.	.08½
Sulphocyanide	lb.	1.50
Argols, white, see Cream of Tartar	lb.	.80
Arsenic, white, Kegs	lb.	.18
Asphaltum	lb.	.35
Benzol, pure	gal.	.75
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.10½
Calcium Carbonate (Precipitated Chalk)	lb.	.15
Carbon Bisulphide, Drums	lb.	.09
Chrome Green	lb.	—
Cobalt Chloride	lb.	2.00
Copper—		
Acetate	lb.	.60
Carbonate, Barrels	lb.	.29
Cyanide	lb.	.65
Sulphate, Barrels	lb.	.09
Copperas (Iron Sulphate, bbl.)	lb.	.02½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.80
Crocus	lb.	.15
Dextrin	lb.	.25
Emery Flour	lb.	.10
Flint, powdered	ton	—
Fluor-spar (Calcic fluoride)	ton	—
Fusel Oil	gal.	5.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	—
Shellac	lb.	—
Iron, Sulphate, see Copperas, bbl	lb.	.04
Lead Acetate (Sugar of Lead)	lb.	.25
Yellow Oxide (Litharge)	lb.	.25
Mercury Bichloride (Corrosive Sublimate)	lb.	1.92
Nickel—		
Carbonate Dry	lb.	.80
Chloride, 100 lb. lots	lb.	.65
Salts, single, bbl.	lb.	.17
Salts, double, bbl.	lb.	.15
Paraffin	lb.	.25
Phosphorus—Duty free, according to quality		40-45
Potash, Caustic, Electrolytic 88-92%, fused	lb.	.32
Electrolytic 70-75%, fused	lb.	.26
Potassium Bichromate, Casks	lb.	.46
Carbonate, 80-85%	lb.	.25
Cyanide, 98-99½%, 100 lb. cases	lb.	.24
Pumice, ground, bbls.	lb.	.05
Quartz, powdered	ton	—
Official	oz.	—
Rosin, bbls.	lb.	.08½
Rouge, nickel, 100 lb. lots	lb.	.40
Silver and Gold	lb.	.60
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.20
Sal Soda	lb.	—
Silver Chloride, dry	oz.	1.43
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	.77½
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—		
Biborate, see Borax, bbls	lb.	.10½
Bisulphite, tech.	lb.	.15
Cyanide, 96 to 98%, 100 lbs	lb.	.27
Hydrate (Caustic Soda)	lb.	.15
Hyposulphite, 100 lb. lots	lb.	.06
Nitrate, tech., bags	lb.	.06
Phosphate	lb.	—
Silicate (Water Glass) bbls	lb.	.03
Sulpho Cyanide	lb.	.90
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.25
Sulphur (Brimstone) bbls.	lb.	.04
Tin Chloride	lb.	65
Tripoli Composition	lb.	.02½
Verdigris, see Copper Acetate	lb.	.60
Water Glass, see Sodium Silicate, bbls.	lb.	.03
Wax—		
Bees, white ref. bleached	lb.	—
Yellow	lb.	.60
Whiting	lb.	.10
Zinc., Carbonate, bbls.	lb.	.24
Chloride, 600 lb lots	lb.	.15
Cyanide	lb.	.45
Sulphate, 100 lb. cases	lb.	.05

COTTON BUFFS

Open buffs, per 100 sections (nominal).		
12 inch, 20 ply, 64/68, cloth	base,	$110.70
14 " 20 " 64/68, "	"	137.50
12 " 20 " 84/92, "	"	143.30
14 " 20 " 84/92, "	"	193.05
Sewed buffs, per pound		
Bleached and unbleached	"	.90

FELT WHEELS

			Price Per Lb.
White Spanish—			
Diameter— 6" to over 16"	Thickness—½" and ¾"		$4.00
6" and 8"	" 1" to 3"		3.35
" 10" to 16"	" 1" to 3"		3.25
" over 16"	" 1" to 3"		3.35
" 6" to over 16"	" over 3"		3.40
Grey Mexican—			
Diameter— 6" to over 16"	Thickness—½" and ¾"		$3.90
" 6" and 8"	" 1" to 3"		3.25
" 10" to 16"	" 1" to 3"		3.15
" over 16"	" 1" to 3"		3.25
" 6" to over 16"	" over 3"		3.30

Above are even diameters, Odd diameters 50c advance.